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FEDERAL AVIATION ADMINISTRATION ACTIVITES IN THE AGENCY'S 50TH --ETC(U)
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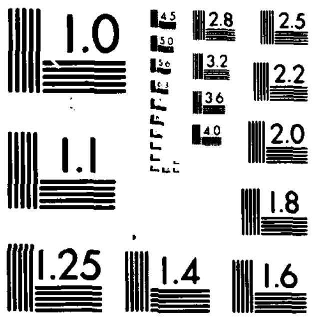

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NATIONAL BUREAU OF STANDARDS 1963-A

LEVEL II

Federal Aviation Administration Activities In the Agency's 50th Year

AN IN-DEPTH REPORT.

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U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Washington, D.C. 20591

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FOREWORD

What does FAA with its worldwide organization, its 58,000 employees and its $3 billion annual budget, accomplish in a given year? This report is an attempt to answer that question as fully as possible for a representative year--in this case, the agency's 50th. Its activities were chosen for in-depth examination for at least three principal reasons: first, because the year was an important landmark in the agency's history justifying such an examination; second, because the review would provide a valuable benchmark for measuring the accomplishments of future years; and third, because much of what the agency accomplished during the year was addressed to meeting the challenges of the '80's--the crucial eighth decade of the 20th century in which we now find ourselves.

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Chapter 1

THE AGENCY TURNS 50

Man first flew in powered flight on December 17, 1903. On May 20, 1926, roughly 22 1/2 years later, the Air Commerce Act of 1926 was signed into law, establishing for the first time the Federal Government's responsibility for the regulation of civil aviation. To implement the Act, a bureau-level agency, the Aeronautics Branch, was created in the Department of Commerce effective August 11, 1926; and on July 1, 1934, the Branch was renamed the Bureau of Air Commerce. On June 23, 1938, with the passage of the Civil Aeronautics Act of that year, the Bureau became the independent Civil Aeronautics Authority. On June 30, 1940, the Authority was returned to the jurisdiction of the Department of Commerce, and became the Civil Aeronautics Administration. With the passage on August 23, 1958, of the Federal Aviation Act of 1958, what had been the Civil Aeronautics Administration in the Department of Commerce, became the independent Federal Aviation Agency. On April 1, 1967, the Agency was assigned to the newly established Department of Transportation (DOT), and became the Federal Aviation Administration (FAA), the designation it bears today.

In May 1976, the Federal role in air regulation--and the FAA with it--turned 50; and in July, less than two months later, the Nation began celebrating its 200th anniversary. Both anniversaries fell within the inclusive period of this report--the 15-month period, June 30, 1975, through September 30, 1976. Comprising FY 1976 plus a transitional quarter, its 15-month duration reflected the fact that the Federal fiscal year, which since 1842 had begun July 1 and ended June 30, would now, for the first time, begin October 1 and end September 30.

FAA: What It Is and What It Does

The Federal Aviation Administration, the aviation component of the U.S. Department of Transportation, operates under authority of the Federal Aviation Act of 1958 (as amended). Its responsibilities under that charter are: to regulate air commerce so as to promote its safety and proper development; foster the growth of civil aeronautics both at home and abroad; control the national airspace to ensure its safe and efficient use; develop and operate a common system of air navigation and air traffic control for both civil and military aviation; promote the development of an effective national airport system; regulate aviation security; and ensure the compatibility of aviation with the environment.

To accomplish what is essentially a dual mission which calls for the agency to both regulate and foster civil aviation, FAA involves itself in a wide variety of actions, programs, and activities. In the first 25 of the many that come to mind, FAA--

- o Provides the systems, procedures, facilities, and devices needed for a safe and efficient system of air navigation and air traffic control to meet the needs of civil aviation and air defense.

- o Operates its own specially instrumented aircraft to check the effectiveness of air navigation aids in the United States and, as required, abroad.

- o Installs, operates, and maintains communications equipment, radio teletype circuits, and traffic and weather message switching stations to ensure the proper functioning of the National Airspace System.

- o Operates and maintains a network of air traffic control towers, air route traffic control centers, and flight service stations to ensure the proper discharge of its air traffic control responsibility.

- Develops and enforces air traffic rules and regulations, and allocates the use of the national airspace.
- Provides for the security of air traffic to meet national defense requirements.
- Locates, installs, maintains and operates visual, electro-mechanical, and electronic aids to air navigation.
- Keeps the manufacture of aircraft, aircraft engines, propellers, appliances, and avionic components under constant surveillance and continuing test, and type-certificates them when it is satisfied that they are safe and comply with Federal Aviation Regulations (FAR's).
- Helps promote civil aviation abroad by the dispatch of technical groups to foreign countries, by training foreign nationals and by providing technical information to foreign governments in need of it.
- Provides technical representation at international conferences, and participates as part of the U.S. delegation in the deliberations of the International Civil Aviation Organization (ICAO), and other international organizations.

- Certificates airmen, pilot schools, aviation maintenance schools, parachute lofts and repair stations.

- Issues operating certificates to airports, airlines, air taxis, and agricultural and external load operators; and has the authority to revoke them, if in the opinion of its inspectors, the required standards are not lived up to.

- Administers programs to insure the satisfactory development of the National Airport System, and as an essential part of that activity, provides grants-in-aid to assist state and local airport sponsors in the planning and development of their airports.

- Conducts research, engineering, and development programs addressed to the enhancement of the safety and efficiency of its operations.

- Operates the National Aviation Facilities Experimental Center (NAFEC). An extensive proving ground equipped to check out and contribute to FAA's research and development programs, NAFEC assists other elements of the agency with their research, development, and technical implementation problems.

- Guarantees loans to small certificated airlines for the purchase of aircraft required to improve the efficiency of their operations and the quality of their service to the public.

- Operates a civil aviation war risk insurance program which provides insurance coverage for U.S. civil aircraft involved in operations in the interest of the U.S. during wars and national emergencies.

- Provides an automated registry service for aircraft, aircraft engines, propellers and appliances, as well as a centralized, nationwide system for recording aircraft ownership.

- Conducts environmental protection programs designed to control air pollution, abate aircraft noise, and prevent degradation of the ozone layer.

- Maintains a network of Flight Standards Service district offices to enhance the safety of general aviation and air carrier aviation operations, and to provide the supervision and inspection required for the proper implementation of the agency's aircraft certification program.

- Conducts an extensive civil aviation security program to deter and prevent hijacking and sabotage.

- Maintains quality control assurance units and other special test and inspection sections in its regional engineering and manufacturing echelons to insure that devices and equipment that it inspects prior to certification conform to the approved design and comply with the appropriate Federal Aviation Regulations (FAR's).

- Pursues an extensive medical safety research program whose object is to prevent accidents; identify human factors that cause accidents; and insure that accidents which do occur are survivable.

- Maintains a service difficulty program which provides a computerized service for the collection, analysis and dissemination of malfunctions and maintenance difficulties encountered in the maintenance of general aviation and air carrier aircraft.

- Operates a regulatory program to insure that the movement of hazardous materials by air does not compromise safety, especially in passenger-carrying aircraft.

The Changes in the Top Leadership

As the period opened, the agency was led by James E. Dow, the Acting Administrator. Named Deputy Administrator by President Nixon on July 24, 1974, in one of Nixon's last acts

in office, Dow became Acting Administrator on April 1, 1975, following the resignation the day before of the agency's fifth Administrator, Alexander P. Butterfield, a former Air Force colonel and White House aide. Dr. John L. McLucas, a former Secretary of the Air Force, and at one time president and chief executive officer of MITRE Corporation, was sworn in as Administrator on November 24, 1975, and Dow returned to his previous status as Deputy Administrator.

On March 31, 1976, Dow, who had begun his career as an air traffic controller, retired after 32 years of Government service, and Jeff Cochran, previously FAA Associate Administrator for Engineering and Development, was sworn in as Acting Deputy Administrator the next day.

The Year's Accomplishments

The agency's 50th year was marked by many outstanding accomplishments. In a few of the more noteworthy, FAA--

- Completed a long standing program to modernize its flight inspection fleet.

- Inaugurated a high altitude, local flow control/ profile descent system for the use of landing jets at all major terminals in the contiguous 48 states.

- o Prepared and issued free of charge to all active pilots in the country requesting it, a pilot/controller glossary calculated to reduce confusion about the accepted meaning of key words and phrases used in air traffic control procedures by pilots and controllers.
- o Planned for the ad hoc improvement of its flight service station system in the short and intermediate term, and for its full automation in the long term.
- o Continued full-scale implementation of the Upgraded Third Generation (UG3RD) air traffic control system, so as to be in a position to take care of the vastly increased air traffic projected for the 1980's and 1990's.
- o Put into full operation as part of the National Airspace System, the last of the 20 domestic NAS En Route Stage A air route traffic control centers (ARTCC's). Also put into operation as part of the same system, the last of 63 ARTS III automated radar terminal systems.
- o Completed the installation of a conflict alert system at all 20 of its domestic ARTCC's, and began operating at its ARTS III terminals, a minimum safe altitude warning (MSAW) system.

- Completed the installation at all of its air route traffic control centers of two basic support systems: a central control monitoring system (CCMS), to control and monitor on an automatic basis most center mechanical, electrical, electronic and fire alarm systems; and a power conditioning system (PCS) to provide each center with an immediate supply of power in the event of a commercial power failure.

- Let a contract for a direct access radar channel (DARC) subsystem which would go into action when existing radar data processing (RDP) systems at the centers either failed or had to be shut down for routine maintenance.

- Had under active development automatic equipment capable of detecting explosives in lockers, cargo holds and luggage compartments.

- Let contracts to provide its highest density ARTS III terminals with major enhancements including a continuous data recording and playback capability, a fail-safe system which would permit them to continue operating in the event of a component failure, and a continuous radar tracking capability which would enable them to track both transponder and nontransponder equipped aircraft.

The Official Safety Record

Official statistics on the accident and fatality rates of U.S. civil aviation are issued on a calendar, rather than fiscal year basis, by the National Transportation Safety Board (NTSB), as part of its statutory responsibility for determining the probable cause of all civil aviation accidents. In a release issued in January 1976, the Safety Board reported that during calendar year 1975, U.S. air carriers completed the best safety record in years, and that except for total accidents, which increased slightly, the same was true of general aviation.

In air carrier operations--a category that includes the certificated air carriers, the supplemental (charter) carriers, and, for the first time, the commercial operators of large aircraft--there were 45 total accidents in 1975, as compared to 50 in 1974. Of those 45 accidents, two involved the supplemental carriers, seven the commercial operators of large aircraft, and 36 the certificated air carriers. There were only three fatal air carrier accidents in the year 1975. The three, down from 10 in 1974, were the fewest air carrier fatal accidents in the 27 year period since 1949. The 124 fatalities sustained in these three fatal accidents compared with 471 in the 10 fatal ones in 1974. This was the lowest number of fatalities since 1957, when there were 98.

Air carrier accidents in all operations over the 11-year period 1965 through 1975 revealed a consistent downward trend. The high, 86 accidents, occurred in 1965; the low, 45 accidents, in 1975. Similarly, fatal accidents ranged from the 1968 high of 16 to the 1975 low of three. This reflected itself in a drop in total passenger fatalities from 421 in 1974, to 113 in 1975, and a decrease in the passenger fatality rate per 100 million passenger miles flown from 0.197 in 1974, to 0.070 in 1975.

Among the commercial operators, one operator accounted for the two fatalities of the year in that category. Among the supplemental carriers, on the other hand, there was only one accident during the year, and no fatal accidents for the fifth consecutive year.

General aviation, a category that included FAR Part 135, air taxi operators and other non-carrier, small aircraft, also had a good year as compared to the previous year from the point of view of aviation safety. The air taxi operators did particularly well. Total accidents among them decreased from 191 to 180; fatalities went down from 40 to 26; and the total accident rate per 100,000 hours flown dropped from 5.25 to 4.71; and the fatal accident rate from 1.10 to 0.68.

Total general aviation accidents--4,575 in 1975 and 4,425 in 1974--increased slightly for the second year in a row. But fatal accidents in this category decreased from 729 in 1974 to 662 in 1975; fatalities from 1,438 to 1,324; and the fatal accident rate per 100,000 aircraft hours flown from 2.24 in 1974 to 2.01 in 1975--the lowest recorded fatal accident rate for general aviation since the end of World War II.

Chapter 2

AVIATION SAFETY

FAA's basic mission is aviation safety. In addition to an air navigation and air traffic control responsibilities addressed to enhancing the efficiency of air operations and insuring their safety, the agency's safety effort covers an immense array of regulatory, administrative, and advisory actions aimed at insuring the safety of every aspect of the aviation process--actions which the agency designates as its aviation safety function.

Aviation Safety: The Function in Outline

A brief description of what the agency's overall aviation safety function consists of, could well begin with certification, a principal form of safety regulation much used by the agency to maintain and improve safety standards. This type of regulation is particularly important in the certification of airmen, aircraft, and aircraft components, pilot schools, aviation maintenance schools, parachute lofts, repair stations, and airports serving air carriers certificated by the Civil Aeronautics Board (CAB). The certification principle is also at play when FAA issues operating certificates to air carriers, air taxi operators,

rotorcraft external load operators, and helicopter service operators, and monitors their operations with the understanding that their certificates will be revoked if proper operational standards are not maintained.

Other important aviation safety measures in this area include the conduct of an airports data program which yields information essential to aviation safety; the implementation of security measures to deter hijacking and sabotage; and the regulation of the way animals, hazardous materials and handicapped persons are carried in air commerce. In addition, FAA conducts a highly effective, safety-related Engineering and Development (E&D) program addressed to the prevention of fatal accidents and injuries in the various stages of flight, and a medical safety research program designed to improve pilot and air crew effectiveness and assure optimum conditions for their survival during various aircraft emergencies.

The agency also sponsors a variety of non-regulatory aviation safety programs. These include, among others, pilot and mechanic refresher programs and award programs, aviation safety and accident prevention seminars, and the conduct annually of more than 5,000 general aviation safety clinics.

To insure safety in the field, and to monitor air carrier and general aviation operations first hand, the agency operates a nationwide network of more than 100 air carrier district offices (ACDO's), general aviation district offices (GADO's), and flight standards district offices (FSDO's), combining in the one office ACDO and GADO functions. These district offices operate with one principal object in mind: aviation safety. The ACDO's and the ACDO elements in the FSDO's concern themselves full time with the safety of the air carriers; and the GADO's and the GADO elements in the FSDO's, with general aviation safety.

The ACDO's and the ACDO elements in the FSDO's have the task of conducting air safety programs which have to do with the certification, inspection, and surveillance of the operations, maintenance programs and facilities of the Nation's air carriers and commercial operators; the certification and surveillance of their airmen; the surveillance of airports used in air carrier training and commercial operations; and the continuing inspection and surveillance of aircraft used in those operations. The GADO's and the GADO elements in the FSDO's, in turn, conduct safety programs having to do with the certification, inspection and surveillance of men and machines involved in general aviation operations, the airworthiness of general aviation

aircraft, the certification of air taxi operators and aerial dusting and rotorcraft operators, and the inspection and surveillance of general aviation operations to insure compliance with applicable regulations and mandatory safety requirements.

As of September 30, 1976, a total of 1,987 FAA employees--mostly operations, maintenance, and electronic inspectors--were assigned to the ACDO's, GADO's and FSDO's: 623 to the ACDO's; 966 to the GADO's; and 398 to the FSDO's. The ACDO's and the ACDO elements in the FSDO's had assigned to them a total of 618 inspectors. Of that number, 391 were operations inspectors; 161, maintenance inspectors; and 66, electronics inspectors. The GADO's and the GADO elements in the FSDO's, in turn, had assigned to them 492 operations inspectors, 101 maintenance inspectors and 53 electronics inspectors. They also had assigned to them 81 general aviation accident prevention specialists whose job, as the name implies, was to give their full time to the prevention of general aviation accidents.

The GADO's and GADO elements in the FSDO's, all of them in day-to-day, face-to-face contact with the general aviation flying public, are continuously at work helping to promote general aviation safety. They do so by working directly with the airmen in their districts in safety

matters; by monitoring the airworthiness of their aircraft; by checking out the effectiveness of the pilot schools, aviation maintenance technician schools, repair stations, and parachute lofts located in their districts; by taking appropriate corrective action if it is determined that general aviation accidents occurring in them were due to pilot error or failure to comply with the Federal Aviation Regulations (FAR's); and by insisting on, and securing full compliance with the FAR's in their respective areas. In addition, they help insure the safety of the air taxi operators, rotorcraft external load operators, agricultural aircraft operators, and helicopter services doing business in their respective areas by certificating them and continuously monitoring their operations.

The ACDO's and the ACDO elements in the FSDO's contribute to aviation safety in their own way, and have the leverage to do the job. They have it because the air carrier inspectors must approve the way the air carriers conduct their operations if they are to be allowed to retain the operating certificates entitling them to remain in business.

The specifics of the aviation safety activities discussed above, follow.

Airman Certification

Section 101(7) of the Federal Aviation Act of 1958 defines an airman as "any individual who as the person in command or as a pilot, mechanic, or member of the crew, in the navigation of an aircraft while underway; ... any individual who is directly in charge of the inspection maintenance, overhauling, or repair of aircraft, aircraft engines, propellers or appliances; and any individual who serves in the capacity of aircraft dispatcher, or air traffic control tower operator." To become an airman, an individual must have an FAA certificate and be rated in his specialty. He must demonstrate that he has mastered his specialty; and in specialties where this is required, that he meets prescribed physical standards.

For certification purposes, airmen are of two kinds: pilots, and nonpilots. The pilot category includes student, private, commercial, airline transport, flight instructor, helicopter, glider, and "other" pilots. The nonpilot category includes mechanics and repairmen, parachute riggers, ground instructors, dispatchers, control tower operators, flight navigators, and flight engineers. To be valid, pilot, flight engineer, flight navigator, and control tower operator certificates must be accompanied by current medical certificates. However, balloon pilots and glider pilots are exempt from the requirement, as are mechanics, parachute riggers, ground instructors, and dispatchers.

Since November 1974, a rule under FAR Part 61, Certification of Pilot and Flight Instructors, has made it mandatory that all certificated pilots who wish to act as pilots in command, be subject to a biennial flight review (BFR) to determine at the end of every 2 years that they are qualified to act in that capacity for a succeeding 2-year period. The review is, in short, a currency requirement applicable to pilots flying as pilots in command, which permits them to continue in that capacity only if their BFR's are satisfactory.

The certification process has a two-fold aspect. It requires, on the one hand, the establishment of the competency of the applicant in the specialty in which he seeks to be certified; and on the other hand, the determination of his physical condition when that is germane to the certification. The two interrelated requirements are administered separately by the FAA organizations best fitted to take care of them; and the records of both types of tests kept on file at the FAA facilities which can handle them best.

On the competency testing side, the Examinations Branch of the Aeronautical Center at Oklahoma City, prepares the written examinations, study guides, manuals and instructional materials needed to prepare for the written tests for some 35 airmen specialty ratings from ground instructors,

navigators, and pilots, to mechanics and parachute riggers. The examinations are distributed to the 100-and-more GADO's and FSDO's. They are given there, and returned to the Examinations Branch which grades them and keeps the test records on file.

Practical tests for pilot, mechanic, parachute rigger, and other airman specialties are also administered at the district offices. Inspectors qualified as flight instructors take care of roughly half the pilot tests, and designated pilot examiners--experienced private flight instructors highly qualified to do the job--take care of the rest. Biennial flight reviews are also administered at the district offices, with the FAA inspectors and the designated flight examiners, as before, sharing the task between them.

Applicants for mechanic, parachute rigger, and other nonpilot airman certificates are examined by suitably qualified district office inspectors. Mechanic applicants, for instance, are tested by the maintenance inspectors; and the parachute rigger applicants by inspectors qualified in that skill. Similarly,where knowledge of electronics and avionics is called for in a specialty, the electronic inspectors conduct the examination.

When the applicants have passed their written and practical tests, they are certified by the district offices where they took the tests as qualified in their specialties. The Examinations Branch at Oklahoma City is informed; and after recording and filing the details of the tests, and receiving information that they are physically qualified, mails the newly certified airmen their certificates.

About 50,000 new private pilot certificates and an additional 200,000 pilot and nonpilot airmen certificates of all descriptions are certified by the district offices each year. The Examinations Branch had on file as the period closed the records of more than 2,200,000 airmen. Of this number, more than a million airmen were considered active, and 800,000 had medical records.

Administration of the medical side of the certification program is more complex. The Aeromedical Certification Branch (ACB), of the Civil Aeromedical Institute (CAMI), a staff section of the FAA Aeronautical Center at Oklahoma City, the unit principally involved in its administration, receives and reviews more than half-a-million physical examination reports yearly. It is backed by the Data Services Division of the Aeronautical Center, which provides automatic data processing (ADP) support for the medical reports and

airman certification records, making them instantly available from its data banks when needed.

Following a practice that dates back to the Air Commerce Act of 1926, the physical examinations required under the airman certification system are performed in the first instance by private physicians designated by FAA as aviation medical examiners (AME's). As of September 30, 1976, FAA had on its rolls, 7,566 designated AME's. Of these, 6,778 were private practitioners in the United States; 338 were private physicians abroad; and 450 were senior flight surgeons at military bases.

Under the existing procedure, the AME's forward the completed physical examinations to the Aeromedical Certification Branch at Oklahoma City, which reviews them and enters the data in the Data Service's Division Comprehensive Airman Information System (CAIS) data bank where it is available for instant use. During the 15-month period under review, ACB received and reviewed 676,137 reports of physical examinations, including 9,066, which could either be denied by ACB itself, or by the AME's when they transmitted them to Oklahoma City. As of September 30, 1976, there were 781,819 medically certified airmen in the system.

Under FAR Part 67, Medical Standards and Certification, Section 67.27 provides that any airman denied medical

certification, may request reconsideration by the Federal Air Surgeon, who _ex officio_ is also head of the FAA's Office of Aviation Medicine (AAM). Of the 1,324 denials referred to the Federal Surgeon during the 15-month period, 456 were reversed and appropriate certificates issued.

An applicant has a further recourse if the Federal Air Surgeon sustains an AME or ACB denial. Under Section 602 of the Federal Aviation Act, he can petition the National Transportation Safety Board (NTSB) for a review of the denial. During the 15-month period, 379 applicants filed petitions for review by NTSB. Cases dealt with and closed by NTSB during its course included 78 affirmations of FAA denials, 10 reversals of FAA denials, and 295 dismissals.

The system also provides that an airman denied a medical certificate under the medical standards portion of FAR Part 67, may petition FAA under the general rulemaking procedures of FAR Part 11 for exemption from the disqualifying portion of FAR Part 67. The Federal Air Surgeon, assisted by medical specialists appropriate to the case, considers such petitions. Of the 1,091 petitions for exemption submitted during the period, 395 were granted. Of the 696 which were denied, 146 denials were based on the petitioner's failure to provide the specialists called in on his case with the medical information needed to properly consider the petition.

The FAA airman certification program is, without question, the largest program of its kind in the world. As of June 30, 1976--the only date for which official figures are available--there were 1,071,532 active certificated airmen in the country. Of this number, 741,887 were in the pilot category, 329,645 in the non-pilot category. Of the 741,887 airmen in the pilot category, 185,085 were student pilots; 308,971 were private pilots; 190,253 were commercial pilots; 43,949 were airline transport pilots; 45,978 were flight instructors; and 13,629 were helicopter, glider, and "other" pilots. Of the 329,645 persons in the nonpilot category, 208,986 were mechanics; 52,617, ground instructors; 27,099, flight engineers; 24,346, control tower operators; 8,539, parachute riggers; 5,782, dispatchers; and 2,276, flight navigators.

Certification of Aircraft and Aircraft Components

FAA makes certain that new aircraft, engines and propeller models, and their components, parts and accompanying appliances meet prescribed standards when completed, by requiring that they be type-certificated. The agency issues type certificates for new models of aircraft, engines, and propellers when they meet prescribed airworthiness and noise standards, and are believed to be safe. In the case of an approved change in a type-certificated model, FAA

issues a supplemental certificate. On the other hand, if the change is substantial enough to warrant it, the agency issues a new type certificate. Foreign aircraft seeking U.S. certification are subject to standards comparable to those U.S. aircraft must meet.

Certification of aircraft and aircraft components is the responsibility of the Engineering and Manufacturing element of the FAA Flight Standards Service. That element, in addition to providing for the safety of future aircraft designs, has the further task of seeing to it that new aircraft designs and the improvement of existing designs are free of unsafe features and comply with the FAR's.

The agency's E&M organization is on three levels. It consists of an Engineering and Manufacturing Division in headquarters; E&M divisional components in each of the 12 regions; and 20 district offices in the regions.

In addition to managing the overall E&M effort, the Engineering and Manufacturing Division in Washington is responsible for the promulgation and issuance of new safety standards, policies, and special conditions required to insure aviation safety in aircraft designs incorporating novel or unusual features not adequately covered in existing regulations. All other FAA certification functions are delegated to the 12 regional directors to whom the

regional E&M offices report. In 11 of the 12 regions they report through their Flight Standards Division chiefs; in the case of the Western Region (which as to E&M functions is somewhat differently organized than the others), through the Chief of the Aircraft Engineering Division.

Below the regional E&M elements are the field offices which are known in the Western Region as Aircraft Engineering District Offices (AEDO's); and as Engineering and Manufacturing District Offices (EMDO's) elsewhere. At the close of the period, there were three AEDO's in the Western Region and 17 EMDO's elsewhere in the system. The Great Lakes Region had five of the 17 EMDO's; the Eastern and Southwest Regions, three each; the Southern and Central Regions, two each; the New England and Northwest Regions, one each.

Except for Western Region, with its somewhat different organization, the typical E&M organization was wholly part of a Flight Standards Division. In addition to flight test sections, E&M branches, manufacturing inspection sections and other similar inspection units, it generally had assigned to it an Aeronautical Quality Assurance Field Office (AQAFO), and an overall Quality Control Unit, with two principal components: a Systems Worthiness Analysis Program (SWAP) unit; and a Quality Assurance System Analysis Review (QASAR) unit. In Western Region, the quality assurance

units were dispersed. The Aeronautical Engineering Division had the QASAR team; the Flight Standards Division, the SWAP unit.

Of the 561 technical E&M positions in the various regional headquarters, AEDO's and EMDO's at the end of the period, 141 were manufacturing inspectors and 293, engineers, of whom 41 were flight test pilot/engineers. Working closely with the manufacturers, the engineers as a group are responsible for the review of aircraft design improvements before they go into production. The engineers and the manufacturing inspectors at the EMDO's and AEDO's see to it that all production aircraft passing through the factory conform to the approved design. The manufacturing inspectors check the manufacturing process every step of the way, and the flight test pilot/engineers join in the tests at all points where their expertise can be used to advantage. If everything is in order, FAA approval of the manufacturer's quality control system follows. To make assurance doubly sure, the SWAP units take a hand in the proceedings; and QASAR teams conduct systematic industry post-audits to determine whether, and to what extent, FAA airworthiness standards have been complied with.

The FAA certification system is equally effective in taking care of the situation when an unsafe condition is

discovered in an aircraft or aircraft component after certification. When the unsafe condition is detected, the Director of the region in which the plane or component was certificated has full authority to take care of the situation. If the unsafe condition is pressing, or of such magnitude as to make it impractical or contrary to the public interest to issue a notice of proposed action in the matter, he can under FAR Part 39, Airworthiness Procedures, issue an airworthiness directive (AD), as an immediately adopted rule with the force of law, ordering that appropriate corrective action be taken as quickly as circumstances permit. In a less pressing situation, where time is not of the essence, he can use the same FAR to issue an NPRM, following which, after appropriate hearings, a final rule can be developed and the unsafe condition taken care of.

During the 15-month period under review, 85 new aircraft models were type certificated, and supplemental type certificates issued for 1,950 more. Seventy-nine engine models, 25 propeller models, 5 balloon models, 8 glider models, and 470 amateur-built aircraft were also certificated. This brought the total of aircraft certificated as "experimental, amateur-built" to 5,068. In addition, thousands of original airworthiness certificates, export certificates,

and other related aircraft and aircraft component approvals and certifications were issued during the period.

In other notable certification developments, FAA--

- Conducted 544 audits by Quality Assurance System Analysis Review (QASAR) teams to check the compliance of the manufacturers audited with FAA's minimum airworthiness standards.

- Revised the criteria in Technical Service Standard C92 prescribing minimum performance standards for Ground Proximity Warning Systems (GPWS), when equipment which met the criteria began producing an unacceptable number of false alarms during normal operations, making it clear that the criteria had been too stringently drawn. This was taken care of in TSO-C92a, which permitted the operators to alter them in such a way as to insure that the activation device of the GPWS was less sensitive and less likely, therefore, to produce false warnings of imminent collision with the terrain.

- Screened approximately 1,650 surplus military aircraft during the period, under an FAA/DOD agreement dating back to 1973, to determine their civil certification

potential prior to disposal by DOD. Sixty-three percent of the aircraft screened were found to have a good standard certification potential.

- Issued an airworthiness directive (AD) on July 7, 1975, requiring that by December 31, 1977, the floors in crew and passenger areas in the DC-10, the L-1011, and the B-747, be modified and strengthened to withstand in-flight depressurization caused by the sudden opening of a large hole in the lower deck compartment.

- Certificated a man-powered experimental aircraft, the first in the agency's history. The aircraft was developed by Joseph Zinno, a retired Air Force Colonel and former C-141 commander, who, in April 1976, successfully pedalled it into the air and, after reaching an altitude of 30 feet, flew it for 5 seconds at 4 miles an hour before landing.

- Prepared a list of Proposed Special Conditions for the certification of a powered hot air balloon which Raven Industries, Inc., of Sioux Falls, S.D., had under development. The special conditions were prepared by the Engineering and Manufacturing Branch of the Flight Standards Division of the Rocky Mountain

Region, the FAA regional office charged with surveillance of the development. The preparation of these conditions by the region became necessary because the applicable regulation, FAR Part 31, Airworthiness Standards, Manned Free Balloons, had nothing in it envisioning a hot air balloon that was not only equipped with an engine, a propeller, a complex fuel system and an envelope pressure fan, but was also capable of being flown at will in any direction.

- o Issued several supplemental type certificates modifying the Cessna 500 (Citation) aircraft, so that it could be used to take news photos from the air. The Rocky Mountain Region, which was in charge of the certification, put the aircraft into restricted category operation, under terms of which it was: (1) permitted to carry additional fuel in the fuselage; (2) allowed an increase in ramp and takeoff weight; and, (3) given permission for the construction of an operable, in-flight hatch through which the news phot- ld be taken.

- o Certificated Grob Astri high performance sailplanes, imported from Germany, as in the experimental-exhibition category, pending issuance of regular U.S. type certificates for them. The Central Region

was in charge of the certification through its EMDO and FSDO units at Wichita, Kansas.

- Certificated the Boeing 747 Special Performance (SP) jumbo jet B-747 aircraft early in 1976. The new SP aircraft was substantially the same plane as the full-size B-747 but 47 feet shorter. The Northwest Region which devotes the major part of its certification effort to the certification of Boeing aircraft, spent approximately 4,500 man-hours in certifying this shortened version of the B-747.

School, Repair Station and Parachute Loft Certifications

FAA certificates pilot schools, aviation maintenance technician schools, repair stations and parachute lofts; issues advisory circulars on a yearly basis listing the schools, stations, and lofts that have been certificated; and inspects them all periodically to determine in each case whether the certification should be continued. As of September 30, 1976, certifications in this area included the following: 2,697 pilot schools, 138 aviation maintenance technician schools, 3,210 repair stations, and 57 parachute lofts.

Of particular interest here, was the continuing recertification of pilot schools that had been certificated under the "old" FAR Part 141 pertaining to pilot schools, to the

different requirements set forth in the "new" FAR Part 141 (revised). The revised FAR part went into effect on November 1, 1974, at which time FAA agreed to give pilot schools certificated under the "old" FAR Part 141 a 2-year grace period in which to meet the certification requirements of the "new" Part 141.

The revised regulation, while giving the pilot schools greater initiative in the way they presented their courses and tested their students, put them under greater restrictions than before in the way they conducted their advertising, managed their training records, and used airport facilities, simulators, and ground trainers. If a school met prescribed standards in training, course content and quality of instruction, it would be allowed to designate its graduates as qualified without the need for further testing by FAA inspectors or designated pilot examiners, and would be eligible every two years for a renewal of its certificate for a succeeding two-year period.

With most of the schools still operating under the "old" FAR as the period opened, FAA inspectors had a busy 15 months of it recertificating as many as possible of the "old" schools to meet the requirements of the new regulation. The job was still continuing as the period ended.

Of the 2,697 certificated pilot schools in operation as of September 30, 1976, 1,426 had been recertificated under the revised regulation and 1,271 still remained to be recertificated under it.

The period was also notable for its emphasis on special repair station certifications. A major item of interest here was the provision for the special certification of repair stations authorized to conduct non-destructive, X-ray inspections of Beech 18 aircraft wing spars, especially as a number of airworthiness directives had been issued in the matter calling for wing straps and X-ray inspections at 1,200-hour intervals. As a supplement to previous AD's issued the previous September laying down the special X-ray inspection procedures required to take care of the difficulty, a further AD was issued on February 26, 1976, requiring that after July 1, 1976, only FAA-certificated stations that were rated as "Limited Airframe--Beech 18 Series Aircraft--Wing and Center Section Spar X-Ray Inspections," would be permitted to perform such inspections.

To obtain this rating a repair station had to demonstrate that it had the capability required in the AD. It could do so by submitting a set of X-rays to FAA and interpreting them. If FAA determined that the reading of the X-rays and their interpretation was satisfactory, the repair station's personnel would be tested on their ability to read

and interpret X-rays generally. If they passed this test, the repair station would receive the sought-for rating.

H&R Inspection Services of Shawnee Mission, Kansas, the first repair station in the Nation to qualify for this rating, received its certificate on August 10, 1976. The station also received a certificate as of that date for magnetic particle, liquid penetrant and radiographic inspections.

And there were a great many other similar certifications around the country. For example, Mac's Aircraft Repair Station at Boone, Iowa, certificated as a repair station during the period, was given a special rating certifying it to be expert in the recovery of fabrics and synthetics--a specialized skill calling for this special rating.

A further item of interest--and one of particular interest to FAA because the GADO at Kansas City had a direct hand in helping it along--was the continued growth and expansion during the period of the School of the Ozarks. The school, in addition to offering a course in aviation technology at the college level, operates a certificated repair station and a certificated aviation maintenance technician school in which the students attending the school receive on-the-job training in the repair station. The school is located at Point Lookout, Missouri, in the foothills of the Ozarks, in

the southwest corner of the state. In addition to offering the B.S. degree in Aviation Technology, it operates a certificated repair station, and during the period acquired a special avionics rating and qualified as an aviation maintenance technician school.

Perched on a steep bluff, high above the White River, about 8 miles from the Arkansas state line, the school operates a farm, a dairy and a small airport whose 3,000-foot blacktop airstrip overlooks the river and ends abruptly at the edge of bluff. Drawing its student body from young people in the surrounding area in no position to pay for the instruction, the school has established a unique work-study program in which the students staff the farm, the dairy and the airport, and carry on their studies at the same time.

The GADO at Kansas City did everything in its power to help the school establish itself. It helped to secure its repair station certification, its avionics rating and its aviation maintenance technician school certification, and guided it in getting surplus test equipment wherever it was to be had. The school was also successful in securing a number of surplus aircraft for use in avionics and at little or no cost, maintenance training. They included a Convair 240, once used for training at the FAA Academy; a DC-3 that

had been part of the FAA flight inspection fleet; and a converted, Canadian DeHavilland Beaver, secured without charge from the Military.

The story was one of great achievement with comparatively little means. It was in achievement to which FAA was glad to have lent a helping hand, if only for the sake of the hundreds of students at the school who otherwise might never have had the chance for the satisfying aviation careers that this remarkable school makes possible.

Air Carrier Certification

The ACDO's and the ACDO elements of the FSDO's are responsible under FAR Part 121 for the certification and surveillance of the operations of the air carrier operators of large aircraft (i.e., aircraft in excess of 12,500 pounds takeoff weight). Included in that category are domestic air carriers, flag air carriers, commercial operators, supplemental air carriers, intrastate commercial operators, and scheduled cargo operators. They are also responsible, under FAR Part 127, for the certification and operational surveillance of scheduled helicopters operating in the system; and under FAR Part 123, for the certification and surveillance of the country's air travel clubs.

Handling the certification responsibility once the carriers have been certificated requires that the ACDO's

and the ACDO elements in the FSDO's see to it that the carriers whose operations they are monitoring, comply with the applicable regulations and the operational and maintenance requirements set forth in the operational manuals that the FAA inspectors concerned approve and enforce.

The GADO's and the GADO elements in the FSDO's have the job of certificating the country's air taxi operators, and monitoring their operations and maintenance activities after they have been certificated. They have that responsibility under FAR Part 135 for the small air taxis (i.e., those under 12,500 pounds) and under FAR Part 135.2, for large (over 12,500 pounds) air taxis. In some FAA regions, where GADO personnel are not as familiar as could be desired with large aircraft operations, the tendency is to have the ACDO's and FSDO's do the job.

As of September 30, 1976, the ACDO's and ACDO elements of the FSDO's held the certificates of two helicopter operators, three scheduled cargo carriers, six scheduled intrastate operators, 10 supplemental carriers, 14 travel clubs, 19 flag carriers, 21 domestic carriers, and 22 commercial operators. Air taxi operators, large and small, numbered just under 4,000 as of that date. Of this number, 3,920 operated small aircraft and were monitored by the GADO's and

GADO elements of the FSDO's; and 60-or-so (monitored in some cases by ACDO rather than GADO personnel) operated large aircraft, including turbojet aircraft.

It was a tight, well-articulated system, in which every aspect of the certification process was covered, and in which no deficiency was likely to be overlooked for long.

Airport Certification

An airport certification program was provided for in the Airport and Airway Development Act of 1970; and came into being the same year as an amendment to the Federal Aviation Act of 1958. The act, as so amended, directed the FAA Administrator to establish safety standards for airports serving CAB certificated air carriers and to certificate them when they had complied with those standards.

In July 1972, the agency in Federal Aviation Regulation Part 139 prescribed the minimum safety standards applicable to airports serving the large aircraft operations of the scheduled air carriers; and in March 1973, in an amendment to the same FAR, set forth the minimum certification standards for airports serving the unscheduled large aircraft operations, scheduled small aircraft operations, and helicopter operations of the certificated carriers. Because of the low-density traffic at these airports, most were issued

"limited" operation certificates; and, to a lesser degree than the fully certificated airports serving the large aircraft operations of the scheduled air carriers, were required to meet certain minimum safety standards for certification. To give the program even greater flexibility, the Airport and Airway Development Act, as further amended in 1976, provided that the Administrator could exempt the operators of certain air carrier airports from the fire fighting and rescue requirements if he found that compliance with those requirements was unreasonably costly, burdensome or impractical.

The gains in airport safety attributable to this program since its inception were substantial. As of the end of the period, the program was responsible for more than 2,000 safety improvements at approximately 900 airports around the country, most of which corrected conditions which might have contributed to accidents had no corrective action been taken.

To meet certification requirements called for by the program, 406 crash, fire and rescue vehicles were purchased; 320 runways overlaid and repaired; and 325 provided with improved markings. A total of 209 airports were equipped with better lighting; 306 were cleared of dangerous obstructions; and 316 were required to install new fencing. In addition, 319 airports upgraded their two-way crash, fire and rescue (CFR) vehicle ground-radio communications and built 416 new buildings to house the equipment.

As of September 30, 1976, there were 906 certificated airports in the country serving the CAB certificated air carrier: 519 serving the scheduled operations; 397 their unscheduled operations. The safety level of all 906 were monitored by means of annual inspections of their physical facilities and an evaluation of the adequacy of their safety operating standards. Surveillance conducted under the program not only made sure that prescribed safety standards were being complied with, but also that recommendations for removing obstructions, cleaning up safety areas, enhancing fire, crash and rescue vehicle capabilities, and refining and updating emergency plans and procedures were being taken care of in a satisfactory manner. It was a highly productive activity which to the extent that it made for a better ordered, safer airport environment had its own, indispensable role to play in aviation safety.

The Airports Data Program

The Federal Aviation Act requires FAA to collect, maintain, and disseminate airport data of all kinds as an aid to aviation safety and as a basis for airport planning and development. FAA collects the data called for in two ways: part is worked up by FAA inspectors during inspections of individual airports; and, the rest is obtained by mail in answer to specially designed FAA questionnaires on the

subject. The data--much of it vital to aviation safety--is entered on master record forms and used as needed. This data provides an important pool of official airport information for the use of FAA and the aviation industry in planning, programming and budgeting. It is also indispensable to the compilation of the Airman's Information Manual, sectional aeronautical charts, approach charts, and other aeronautical publications essential to the safety of flight in the National Airspace System.

As of September 30, 1976, inputs were being received under the program from 13,700 civil and joint-use airports, heliports, seaplane bases, balloon ports, and glider ports. Of this number, 7,000 were available for use by the public without restriction. The remaining 6,700, including facilities that were both privately and publicly owned, were in restricted use, which meant that they were not available to the public.

The Mechanic Refresher and Awards Programs

The agency makes sure that the country's aviation mechanics receive the best possible training, that their skills are kept abreast of technological change, and that outstanding achievements by representative mechanics are suitably acclaimed and rewarded. It does so because of the realization that aviation safety begins with alert, competent mechanics who are well-schooled in their profession and take

pride in their work. As in previous years the agency continued to support programs aimed at upgrading their skills and giving the most outstanding of them special recognition.

During the period, FAA--

- Cosponsored with the Aviation Safety Foundation of the Aircraft Owners and Pilots Association (AOPA), eight refresher clinics for aviation mechanics. The clinics, usually a couple of days each at important cities across the Nation, featured presentations by FAA, AOPA, and industry representatives on late developments in maintenance and related problems. The response to the clinics was extremely favorable, and the agency planned to expand the programs to include regional, state-sponsored airworthiness safety seminars to be conducted annually by the states on a regionally oriented, rotating basis.

- Developed presentations for mechanic audiences on how to keep proper maintenance records; conduct aviation inspections; comply with airworthiness directives; and, in general, what to do to become proficient in the performance of these and similar mechanic tasks. The presentations which were to begin early in FY 1977, were to be given at Flight

Standards field offices, safety meetings, clinics and seminars conducted by schools, state aeronautic commissions, professional maintenance agencies and other similar aviation safety-oriented organizations.

- Honored for the 13th year, the two mechanics in the Nation adjudged to have made the greatest contribution to aviation safety during the preceding year. The two winners were: LaVerne Gondles, an aviation mechanic at the American Airlines Maintenance Center at Tulsa, Oklahoma; and William A. Enk, a certificated A & P mechanic and owner of his own aircraft and service business at Blue Springs, Missouri.

  Gondles, noted for his ability to modify trouble prone equipment and to improve mechanic work methods, was particularly noted for having worked out a modification for the cargo door activator on the DC-10, that was authorized for use on DC-10's the world over.

  Enk, who in addition to his A & P certification, also held an aircraft inspection authorization and ATR pilot and Instrument and Flight instructor

ratings, was also the designer and developer of a low toxicity fire extinguisher system for general aviation aircraft.

The Service Difficulty Program

This program, a continuing FAA maintenance support activity which has to do with the computerized collection, analysis and dissemination of maintenance service difficulties, is a function of the Flight Standards Maintenance Analysis Center (MAC) at Oklahoma City. MAC maintains a record of all reported malfunctions and service difficulties, and with the data available to it can pinpoint trends in maintenance malfunctions and service difficulties in immediate need of corrective action.

Data for the program comes from all segments of civil aviation, including industry, general aviation and air carrier aviation. On the basis of these inputs, Service Difficulty Reports of air carrier and general aviation malfunctions and service difficulties are prepared daily and disseminated free of charge to industry, industry affiliates, and others in the aviation community with a demonstrated need for the service. In addition, MAC provides the public upon request with ADP printouts of air carrier and general aviation service difficulties reported in previous years.

The program has proven itself equal to the task of taking care of service difficulties as they arise. Effective and well coordinated, it spans the country and serves as the focal point in the agency for the analysis of maintenance problems which must be dealt with promptly if the safety of civil aviation is to be maintained.

How well the program has been working has not gone unnoticed internationally. Indeed, its success has been such that it is being copied abroad. The civil aviation authorities in five foreign countries--Canada, France, Great Britain, Japan and Brazil--have established service difficulty programs specifically modeled on the Oklahoma City MAC operation.

The Regulatory Review Programs

These programs--intended to keep the Federal Aviation Regulations (FAR's) in step with technological change--began in February 1974, with the Airworthiness Review Program of that year. The review considered changes to FAR Parts 21, 23, 25, 27, 29, 31, 33, and 35, having to do with certification procedures on projects and parts, airworthiness standards of normal, utility and acrobatic aircraft, transport aircraft, rotorcraft, manned free balloons, engines, and propellers; sections of FAR Parts 91, 121, 127, 133, and 135, containing airworthiness requirements or operating limitations relating

to type certification performance requirements; and it looked into as much of FAR Parts 27, 36, and 43, as related to airworthiness requirements. As a result of the discussions at the review conference which was held in December 1974, seven notices of proposed rulemaking containing a total of 572 proposed changes to the regulations had been issued, and an eighth and final NPRM was being prepared as the period opened.

The eighth and final NPRM, based on proposals submitted at the conference, was issued on June 30, 1975, and published in the Federal Register on July 11, 1975. This notice (NPRM 75-31) proposed 120 changes to the aircraft, engine and propeller type certification standards, as well as changes to the procedural and operating rules relating to those standards. The NPRM brought to 692 the proposals for changes resulting from the review.

In addition an amendment which stemmed from another Airworthiness Review Program NPRM, and had to do with rotorcraft anticollision light standards, was issued on February 3, 1976. As the period closed, the drafting of additional amendments based on other Airworthiness Review Program NPRM's was nearing completion.

The public acceptance of the Airworthiness Review Program had been such that FAA added a Biennial Operations Review Program in February 1975. As announced at the time,

the review was to consider changes to FAR Part 43, maintenance rules; Parts 63 and 65, airman certification rules; Part 91, air traffic and general operating rules; Parts 121, 123, 127, 133, 135, and 137, rules having to do with the certification and operation of air carriers, air travel clubs, air taxi operators, agricultural aircraft, operators, rotorcraft external load operations, and other lease or for hire operations. And it was also to consider for possible revision, FAR Parts 101 and 105, which had to do with moored balloons, kites, unmanned rockets, unmanned balloons, and parachute jumping.

Published in the Federal Register in February 1975, the notice announcing the conference elicited some 1,600 proposals for changes to the FAR's concerned. In late May 1975, the agency sent out a compilation of 904 of these proposals for public comment. Comments were received in August 1975, and an Operations Review Conference Agenda and related working documents were distributed by mid-October 1975. The conference was held in December 1975, and a Conference Summary distributed in March 1976. Notices of Proposed Rule Making, several of which had already been issued, were being developed as the period closed to take care of all proposals discussed at the conference. Amendments to the various regulations reviewed were to follow the notices after the comment period closed, the comments analyzed and final rulemaking decisions taken.

With the Airworthiness Review Program and the Operations Review Program well under way, a new type of regulatory review program concerned with fewer issues and capable of getting results sooner, was announced in the latter part of the transitional quarter. The future programs would, where possible, entail more frequently scheduled reviews than before; deal with much narrower groupings of regulatory issues; allow a much shorter time for the adoption of amendments; and, in general, concern itself with issues relating usually to one FAR Part at a time, or a similarly limited regulatory area. The program would enable FAA, through face-to-face discussions with the public in a conference setting, to issue NPRM's in a comparatively brief span of time, and to work out final rulemaking decisions quickly after the public comments in the matter had been received.

The first of four planned regulatory reviews for the new fiscal year, was launched on September 13, 1976, with a notice in the Federal Register which announced that the review would be confined to FAR Part 135, which had to do with air taxi operators and operators of small aircraft. An agenda and compilation of proposals was developed and mailed to 4,000 listed air taxi operators on September 22; and an advisory circular was issued a few days later announcing that the conference would be held at Denver, Colorado,

during the week of November 8 through 12, 1976. The procedure called for the NPRM's to be developed on the basis of the discussions at the conference, with amendments to the FAR to follow after the public had been heard from.

It was clear as the period closed that the FAA regulatory review program to keep the FAR's abreast of the times was going well and was right on schedule.

Framing and Enforcing the Regulations

FAA has a staff of approximately 70 attorneys in the Office of the Chief Counsel in Washington, and 40 in the regional offices. The responsibility for the framing and legal enforcement of the regulations falls on two principal staff sections of the Office of the Chief Counsel, namely--the Regulations and Codification, and the Operations and Evaluation Divisions. The Regulations and Codification Division is responsible for framing the regulations correctly; for making certain that they are consistent with the law and agency policy; and for seeing to it that the rulemaking process as conducted by the agency is procedurally correct and in keeping with the provisions of the Administrative Procedures Act. The Operations and Evaluation Division, in turn, is in charge of the legal enforcement of the regulations. Its attorneys prosecute actions against violators; represent

the agency in hearings before the National Transportation Safety Board; and work with the Department of Justice in criminal proceedings and in cases appealed from NTSB to the Court of Appeals.

FAA's regional attorneys in 14 cities across the Nation and overseas provide the necessary legal services for the agency's regional offices, field offices and field facilities. They engage in every type of legal work in which FAA has an interest; and acting in concert with the enforcement echelon in headquarters are active in the enforcement of the regulations in their respective areas.

Significant enforcement actions of the period included--

- The jailing by a judge of the U.S. District Court in Boston of a pilot who refused to surrender his revoked pilot license. Adjudged to be in contempt of court for his refusal, he was taken into custody and kept in jail for 100 days.

- The affirmation by the U.S. Court of Appeals of the agency's revocation of the airline transport pilot certificate of a pilot who performed acrobatics in a control zone and below the minimum altitude prescribed for acrobatic flights. The pilot had incurred civil penalties on two prior occasions for

the same regulatory violations. In affirming an order of the NTSB which had upheld FAA's revocation order, the Court held that in the exercise of his emergency authority the Administrator was not required to notify the pilot prior to ordering revocation of his airman certificate.

- The affirmation by an NTSB Administrative Law Judge of FAA's denial of an airman medical certificate to an airline transport pilot who was charged by the agency with having a history of dependence upon the drug, Ritalin, a type of amphetamine. Prior to his arrest for uttering forged prescriptions for the drug, the pilot had been acting as Captain of a Boeing-727 for a major scheduled airline. The pilot appealed the finding, and the full Board of NTSB had still to rule on the appeal when the period ended.

- The holding of a hearing before an NTSB Administrative Law Judge regarding the appeal of a major airlines captain whose airline transport pilot certificate was revoked on the ground that he operated a Boeing-727 so carelessly or recklessly that, in making a landing at the Harry S. Truman Airport at St. Thomas in the Virgin Islands, he failed to stop the aircraft on the runway, thereby causing the plane to crash

and to kill 37 persons. The hearings ended when the parties reached a settlement under terms of which the captain agreed to the revocation of his pilot license.

- The holding of a hearing to determine whether a "public service" air ambulance operator was justified in operating without an air ambulance operating certificate under FAR Part 135, Air Taxi Operators and Commercial Operators of Small Aircraft, because of the not-for-profit nature of its activities. Although it conceded receiving compensation for the service, Mercy Flights, Inc., operating an air ambulance service in southern and eastern Oregon, refused to apply for a certificate on the ground that the public service aspect of its activities was such that its operation could be considered as not for compensation or hire within the meaning of the regulation. After holding a public hearing in the matter, the FAA regional counsel concluded the flights were in violation of FAR Part 135, and that a certificate was needed to conduct them. An enforcement action was prepared, but the matter was dropped when the operator agreed to apply for a certificate.

- The seizure for infraction of the FAR's of a Lockheed Electra, a four-engine turboprop capable of carrying up to 120 passengers, which had been engaged in what was described as a gambling junket operation. For $20 a roundtrip, the Electra carried members of the public from various cities on the West Coast to Reno or Las Vegas and return. An investigation into the operation disclosed that the crew was kept on duty without crew rest for periods of up to 62 hours; that various airworthiness directives and maintenance requirements were not complied with; and that the operation, in general, was not in compliance with applicable FAR's.

  Fearing for the safety of the public, the Regional Director in February 1974, ordered the aircraft seized, and brought an enforcement action in U.S. District Court against the aircraft, its owner, and others involved in the operation. The case went to the jury in May 1976. The verdict was returned in favor of FAA, and the judge assessed civil penalties against the various defendants totalling more than $950,000--the largest, single civil penalty entered in favor of FAA in an enforcement action up to that time. One of the defendants appealed, and the appeal was pending before the Court of Appeals when the period closed.

- The collection by FAA during this 15-month period of civil penalties of $750,000 for infraction of the FAR's.

<u>The Aviation Safety Reporting Program (ASRP)</u>

FAA has long recognized the need for eyewitness reports from those involved in mid-air near misses and other dangerous incidents encountered in day-to-day flight operations in the national airspace, in order to be able to use the information to remedy dangerous conditions and prevent potential accidents. An FAA program of this sort--the Near-Miss Mid-Air Collision Reporting Program, which ran from 1968 through 1971, did not get the desired results because of the reluctance of FAA to guarantee the anonymity of the persons involved in the dangerous incidents reported on; and the fear that FAA, as enforcer of the FAR's, would not easily overlook such infractions of them as the reports might reveal.

Seeking to profit from the experience, FAA took a different tack. In April 1974, it announced a new safety reporting program under which it would waive penalties for regulatory infractions revealed in the reports and see to it that the anonymity of those involved in the incidents described in them was preserved. This was to be subject, however, to two conditions--that the promised anonymity would be preserved only if specifically asked for; and that

punitive action would not be waived in cases involving accidents, criminal behavior, gross misconduct, recklessness or negligence. The program was initially to cover reports on such things as potentially unsafe instrument approach procedures, air traffic control deficiencies, unsafe airport conditions and near mid-air collisions. Later, it was to be extended to other areas.

The new program did not do that well either. It was terminated in March 1975, 11 months after it began. Fewer than 1,500 reports were received in the 11-month period. This was far below what had been expected; and many of the reports were of poor quality and of little use to the program.

The difficulty was the same as before--a fear that FAA, despite its assurances to the contrary, might still use the information as a basis for punitive action. FAA had a further recourse and took it. In September 1975, it entered into an agreement with the National Aeronautics and Space Administration (NASA), under terms of which NASA would act as an independent third party for the receipt, processing and analysis of all reports filed under the program by pilots, air traffic controllers, and others.

It was agreed that while NASA would pass on the substance of the reports to FAA, it would disclose to no one

the names of persons filing the reports or named in them, except in cases involving accidents or criminal offenses. It was also agreed that an advisory group, in which consumer organizations and members of industry and government would be represented, would be established to counsel NASA on the conduct of the program and to evaluate its effectiveness once it had gotten underway, especially as regards its success in preserving the anonymity of those involved in the reports.

The program, with NASA's Ames Research Center in California in charge, began in mid-April 1976 and went well from the start. ASRP reports received at Ames quickly began running more than double the number received when FAA had charge of the program; and the data, generally speaking, was of much better quality than before. Procedures used were simple but effective. The essential data contained in the reports, less the identity of those involved, were entered in the center's data bank and analyzed. Problems and trends pinpointed by the computer were promptly forwarded to FAA. And the agency got even faster service when the reports revealed problems obviously in need of immediate attention.

Analysis of the reports showed that roughly 67 percent were from pilots, 29 percent from air traffic controllers,

and 4 percent from "others." More than half of the incidents reported on were Air Traffic Control-related, and approximately 10 percent had to do with "unsafe" landing conditions. In an initial statement on the subject, NASA professed itself to be extremely pleased with the high quality of the reports, and noted that they were being prepared with considerable thought and diligence.

It had become clear by September 1976 that NASA was developing a computer-based data bank of great potential usefulness to FAA. Pilots, controllers, and others with knowledge of dangerous incidents or conditions, were no longer hesitant to file reports on what they saw and were reporting them with candor.

Air Transport of Hazardous Materials

In 1972 and 1973 respectively, a House Subcommittee on Government Operations and the General Accounting Office investigated the risks attendant upon the shipment of hazardous materials by air, and the way FAA was taking care of the problem. The House Subcommittee, chaired by Congressman Jack Brooks of Texas, reported in June 1972; the GAO, in May 1973. Both thought FAA could do more to implement the responsibility, and each reported on the steps they thought FAA should take to improve the way it was doing the job.

The agency accepted their recommendations and its Flight Standards Service, the headquarters staff section in charge, at once began implementing them. In addition to establishing a nationwide regulatory organization with a headquarters staff in charge, it stepped up enforcement of the applicable regulation--FAR Part 103, Transportation of Dangerous Articles and Hazardous Materials, and increased the penalties for its infraction. And it further saw to it that the training of its field inspectors in the handling of hazardous materials was intensified, and that the air carriers air taxi operators, shippers and freight forwarders also received such training.

In full operation during the period, the agency's hazardous materials organization consisted of headquarters staff of six, 18 full-time regional hazardous materials coordinators and 108 part-time district hazardous materials coordinators--one at each GADO, FSDO and ACDO. The task of the headquarters staff was to direct, coordinate, and provide guidelines for the regional and district coordinators. The regional coordinators--specially trained Flight Standards inspectors chosen for their expert knowledge of hazardous materials handling requirements--had the task of advising their respective headquarters on those requirements, overseeing regional hazardous materials surveillance and inspection activities, and carrying on a regional hazardous materials

training program. The 108 district hazardous materials coordinators were Flight Standards inspectors who took on the hazardous materials monitoring and inspection responsibility as an additional duty. In that capacity they provided needed local expertise in hazardous materials handling requirements; conducted hazardous materials inspections; and kept close watch on hazardous materials enforcement problems and developments in their respective districts.

The training program made great strides during the period. Additional courses were worked out, and an effort was made to extend the training to all who were involved in any way with the handling of hazardous materials shipped by air.

The first course for Flight Standards inspectors opened in June 1973 at the Transportation Safety Institute (TSI) at Oklahoma City. By the end of the reporting period, 630 inspectors had taken the course. In addition, a decision was reached to have all FAA inspectors at the GADO's, FSDO's and ACDO's take it, and to carry the specialty as an additional qualification. TSI also began developing an advanced course during the period for hazardous materials coordinators who had taken the basic course. The institute was scheduled to begin giving it in early 1977.

FAA made the training mandatory for air carrier and air taxi operators. In amendments to FAR Parts 103, 121, and 135, the agency required all air carriers, air taxi operators, and other Part 135 operators, to establish training programs for their air crews to insure that the latter were fully trained in the regulatory requirements for which they were responsible. The training data, which was to be incorporated in the operator's crew training manuals, were to provide instruction in the proper packaging, marking, labeling, handling and storage aboard of the materials. The training programs were to become part of each operator's operational responsibility and the quality of instruction given was to be taken into account by the FAA Principal Operations Inspectors (POI's), who had oversight of their operations, in determining whether they should continue to certify them as being entitled to their operational certificates.

The hazardous materials training put on in the regions by the regional hazardous materials coordinators were one or two-day "road show" type affairs. Informal in tone and open to all with an interest in the subject matter, they were held an average of six to eight times per year per region, and were a continuing and highly thought of feature of the hazardous materials activity in the various regions.

In addition to the various FAA-sponsored training courses in the area, DOT, with FAA's help, and the help of

others of its modal agencies, had for several years conducted an intermodal hazardous materials seminar program at leading cities throughout the Nation. The seminars dealt with the hazardous materials shipping problem encountered in all the transportation modes, and were of particular interest to air and surface shippers and carriers, container and package manufacturers, and others with hazardous materials shipping problems.

The seminars, in which FAA's role was to provide speakers and panel members for the air shipping portion of the program, were well received. A total of 5,177 persons attended the 75 seminars put on during the period. Total persons attending the 68 sessions held since the program began were well over 11,000.

FAA's organization and training activities in the area were given further impetus when DOT in July 1974, specifically delegated to the agency full responsibility for issuing and enforcing its hazardous materials regulations. In addition, it authorized the agency to increase still further the penalties that could be imposed for violations. The cumulative affect of all these actions on enforcement became quickly apparent. As compared to the 571 inspections recorded for the 1971 through 1972 period, there were 9,053 in 1974; 11,000 in 1975; and 11,798 in 1976. Recommended civil

penalties, often nominal before, went up sharply, and for 1976 totaled $190,000.

Thus far FAA had developed its own hazardous materials rules and had incorporated them into its own regulation--FAR Part 103. It had set up its own regulatory and enforcement criteria and discharged its hazardous materials responsibility with a minimum of oversight from DOT's Office of Hazardous Materials (OHM). But this relatively independent stance as regards hazardous materials regulation came to an end during the period. The change came as a result of the signing into law on January 3, 1975, of P.L. 93-633, the Transportation Safety Act of 1974, under which the regulations applying to the transportation of hazardous materials in all the transportation modes were thenceforward to be in the Secretary's hands. Not only did the act give the Secretary increased regulatory and enforcement authority over the transport of hazardous materials in all the transportation modes, it also gave him authority to regulate packaging, labeling, handling, and inspection; authorized him to make exemptions under the act; and permitted him, after giving notice to violators and providing them with an opportunity for a hearing, to issue orders directing compliance with the act, and in default to take the matter to court.

The act was also notable for a further far-reaching provision. Section 108, concurred in by FAA, the Air Line Pilots Association, and the U.S. Atomic Energy Commission, prohibited the transport on any passenger-carrying aircraft of radioactive materials, except those "intended for use or incident to research, or medical diagnosis or treatment, so long as such materials as prepared for and during transportation do not prove an unreasonable hazard to health and safety."

Penalties under the act were heavy. For civil violations they were $10,000 per violation. For criminal violations, they called for a fine of up to $25,000 for each offense and imprisonment for a term of up to 5 years, or both.

The Department took its first steps to implement the act in July 1975, just as the period opened. Authority granted the year before to the modal agencies to publish their own regulations relating to the transport of hazardous materials by their particular mode was withdrawn effective July 7, 1975, and vested in the Materials Transportation Bureau (MTB) a new department agency, established the same day. MTB was to manage the hazardous materials program and take care of rulemaking and publication of the regulations. Its predecessor, the old Office of Hazardous Materials Operations

(OHMO), assigned to MTB effective that day, was to process exemption requests; distribute the regulations; and, in general, take care of the operational details of the program.

The next step was to revoke the existing regulations of the modal agencies and to consolidate them as part of an intermodal MTB hazardous materials regulatory code. This was done on April 15, 1976, in a docket which, effective July 1, 1976, consolidated all the modal hazardous materials regulations under Title 49, Code of Federal Regulations (CFR), the DOT part of the CFR. On that date, FAR Part 103 was revoked in its entirety, and all its provisions were incorporated into Part 175, 49 C.F.R., the MTB regulatory part which had to do with the carriage of hazardous materials by air.

The revocation of FAR Part 103 and the simultaneous consolidation of its provisions into Title 49 C.F.R. made it necessary for FAA to take immediate steps to revise the guidance provided to the air carriers, air taxi operators and other FAR Part 135 operators in the way they conducted their mandatory hazardous materials training programs. This it did by cancelling Advisory Circular 103-3, the old advisory circular on the subject, and replacing it with AC 121-21, a completely revised circular having to do with it. The agency also lost no time in revising hazardous materials

inspection procedures at the GADO's, FSDO's and ACDO's to make them conform with the somewhat different requirements set forth in Part 175, Title 49 C.F.R..

In still another change the Secretary delegated to the Administrator authority to carry out functions vested in him under the act in matters having to do with the enforcement of regulations relating to the transport of hazardous materials by air, and especially those having to do with surveillance, inspections, and the recommendation of penalties for violations. This made it possible for the FAA Administrator in an amendment of August 2, 1976, to FAR Part 13, Enforcement Procedures, to redelegate to the FAA Chief Counsel and each regional counsel the authority delegated to him by the Secretary.

A further adjustment was accomplished with the issuance of Headquarters Notice N. 1100.41, on August 13, 1976, under terms of which the Administrator redelegated part of the authority delegated to him to each FAA aviation safety inspector involved in the monitoring and inspection of hazardous materials shipped by air. This gave the FAA regional and district hazardous materials coordinators full authority to act in securing compliance with the act and with orders and regulations issued under it.

Putting the dual MTB/Flight Standards hazardous materials system into day-to-day operation was not as complicated as

might at first appear. Petitions for emergency exemptions, MTB's specific responsibility, reached it via the GADO's, FSDO's and ACDO's. Other exemption petitions and rulemaking proposals, after first being docketed in MTB and going to Flight Standards for evaluation and development, were returned to it as appropriate in the form of NPRM's, ANPRM's, exemptions or denials. The result, after review by the appropriate legal office in OST (TGC-50), and further coordination with Flight Standards, was officially issued in the name of the Department by MTB. Congress had mandated such a system in P.L. 93-633, and its wishes were being scrupulously followed.

Air Shipment of Live Animals

Following an NPRM of March 1974 addressed to the improvement of the handling of live animals shipped by air, FAA issued a final rule in the matter in early August 1974 as an amendment to FAR Part 121, Certification and Operations: Air Carriers and Commercial Operators of Large Aircraft. The rule which was to go into effect on February 18, 1975, prohibited certificate holders from carrying live animals in containers in cargo compartments unless the containers were secured against shifting, protected by webbing, partitions, or other means to prevent damage or crushing by other cargo, and were located in the compartment in such a way that their ventilation was not obstructed.

Relatively few comments were received when the proposal was in the NPRM stage. But in early February 1975 when its implementation was imminent, a number of airlines petitioned for its withdrawal on the ground that they would have to drastically curtail animal shipments if it went into effect. A few even threatened to embargo them altogether if it did. This caused an immediate furor among pet dealers, medical schools, research laboratories, and others whose operations depended on the uninterrupted shipment of the animals. The agency was bombarded with letters and mailgrams protesting the threatened curtailments and asking that the rule be rescinded, or if that was not possible, that the date for compliance be extended so that the matter could be given further study.

The furor was such that FAA issued a further amendment to FAR 121 on February 15, 1975, extending the effective date to October 8, 1975. But that failed to stop the commotion. Petitions and letters continued to pour in asking for a rescission of the rule, or in default of that for a new effort at rulemaking. And in May 1975, when the Air Transport Association (ATA), representing the Nation's airlines petitioned the agency to revise the rule on the grounds that, were it to go into effect as written, its members would be unable to carry animals in anywhere near

the numbers required by the public, FAA decided to pursue the matter no further. On October 17, 1975, the day before the rule was to go into effect, the agency rescinded the amendment on the ground that implementing it would cause insuperable problems for the various industries and agencies in the country whose continued operations depended on the uninterrupted shipment of animals by air. In listing its reasons for the rescission the agency said it was satisfied that implementing the rule would not only result in sharply limiting the number of animals the airlines could carry; reduce the space available for other cargo; result in higher shipping costs and poorer service; and, because of increased delays in shipment, greater risk to the animals themselves.

Transporting the Handicapped

As the 1970's opened, the Civil Aeronautics Board (CAB) began receiving an increasing volume of complaints from handicapped persons that they were being unfairly denied the right to travel by air because of their physical handicaps. The practice of the Board had been to give

the carriers a wide latitude in determining the conditions under which they would accept handicapped persons as passengers. The difficulty was that some of the carriers would not carry them at all, justifying their actions by citing Section 1111 of the Federal Aviation Act of 1958 which authorized the carriers to refuse transportation to anyone whose transport they considered "inimical to the safety of flight." But this overlooked Section 404(b) of the act which enjoined the carriers from subjecting passengers to unjust discrimination or disadvantage. It also overlooked an FAA advisory circular of 1968 on the reception of the handicapped at the terminals which, in effect, recognized them as an important and growing segment of the travelling public entitled to considerate treatment both by terminal and airline authorities. It also ran counter to the prevailing mood of the country which was strongly in favor of helping the disadvantaged; and it served to make the handicapped more militant than they had been before in demanding that something affirmative be done to insure their right to fly.

After reviewing the situation, CAB concluded that the time had come to take whatever regulatory action was necessary to insure that the carriers accepted as many of the handicapped passengers as they could reasonably accommodate.

On October 14, 1971, the Board issued an advance notice of proposed rulemaking (ANPRM) indicating its intention to amend its regulations to establish the terms and conditions under which the certificated air carriers would be required to accept handicapped

persons as passengers and asking for public comment on how to proceed in the matter. After the ANPRM had been out for some time, CAB realized that since the safety considerations involved were an FAA responsibility it would be prudent to have FAA dispose of them first, before the Board proceeded with its economic regulations.

Deferring further action of its own in the matter, CAB held a series of meetings with FAA during which it was agreed that FAA would establish safety standards under FAR Part 121 permitting the transport of as many handicapped persons as possible consistent with safety. When FAA had established the applicable safety criteria, CAB would follow with economic rules appropriate to the situation.

In an ANPRM issued in May 1973, FAA stated the problem and solicited comments from the public on how to handle the matter. More than 500 comments were received, and most were of a nature that indicated the need for public hearings. Six such hearings were held in November 1973 at representative locations around the country and the comments analyzed. The subject was also given in-depth study by the Civil Aeromedical Institute (CAMI) at Oklahoma City, which had special expertise in the area; and after being carefully worked over and coordinated with CAB, an NPRM was issued in early July 1974.

The proposal in the ANPRM made a sharp distinction between handicapped persons able to proceed to an exit in the event of an emergency evacuation without help from any one, and others who were unable to do so and needed the help of another person to get to the

exit in time. Under the proposal only those persons who needed assistance in an emergency evacuation would be considered "handicapped."

The ANPRM proposed that certificate holders no longer be permitted to refuse to carry the deaf and blind since they ~~would~~ could readily proceed to the exits on their own in spite of their disabilities. Nor could they deny boarding to those with other disabilities who presented a current medical certificate vouching for their ability to evacuate the plane without help. For those who needed help, it proposed that the certificate holders be required to carry as many such individuals as there were emergency exits in the plane. Persons in this category would be assigned seats near the exits to insure that not more than one of them would have to use a given exit in an emergency.

A number of other innovative provisions were also included in the proposal. One called for the waiver of the requirement that seat backs be in an upright position on takeoff and landing when handicapped persons were aboard who were unable to sit erect. Another provided that only one litter patient would be allowed per flight; and that to be allowed boarding, he or she would have to be accompanied by a personal attendant. Still another provision dealt with the storage of canes and crutches brought aboard by the handicapped.

The proposal was backed by careful research on the part of CAMI, which had even gone so far as to use dummies and persons with simulated disabilities to determine the best way to seat the

handicapped to ensure that they could be evacuated quickly and safely. While both FAA and CAB were satisfied with the adequacy of the actions proposed, the public—or at least that part of it which responded to the notice--thought otherwise.

A total of 1,554 comments were received from individuals and organizations by the cutoff date in October. Of that number, 1,400 or just over 90 percent were strongly opposed to the proposal; and of those, a high proportion proceeded to criticize it at virtually every point. The agency was attacked for not being sufficiently sympathetic to the plight of the handicapped and for proposing the use of demeaning criteria in determining who was handicapped and who was not. Others took exception to the fact that FAA put limits on the number of handicapped who could be carried, and questioned its right to do so. Still others criticized the agency for not using the truly disabled in the tests that CAMI had conducted at Oklahoma City the year before as a basis for the rulemaking initiatives in the proposal.

It was clear that the public had completely misunderstood what the agency proposed doing. In setting up criteria to identify the handicapped who could take care of themselves in an emergency, and those who could not, and then restricting the number of the heavily handicapped to the number of available exits, FAA thought it had worked out a rule which could not only be applied uniformly to all the carriers but which would go a long way to give the heavily

handicapped the same chance of survival in an emergency as the able-bodied and less handicapped.

At first FAA was puzzled by the public reaction. In the face however of so many disapproving comments it decided that the best thing to do was to take another look at its basic assumptions and conclusions in the hope of working out a more flexible and less contentious approach to the problem.

As part of the reexamination, the agency had CAMI conduct new tests using individuals with actual handicaps, interspersing them with groups of individuals without handicaps. It also reviewed the records of past crashes in which handicapped persons had been carried and in which handicapped and able-bodied alike had survived.

The new tests at CAMI and the review of the records indicated that the presence of handicapped persons served to delay evacuations only minimally and that sufficient attention had not been paid to the fact that there were wide differences between the various airlines in their emergency practices and evacuation procedures. Since the differences appeared to be worth preserving in the interest of safer operations, FAA concluded that its proposed across-the-board regulation should not be adopted. Instead, the individual carriers themselves should be allowed to develop emergency procedures capable of taking care of the needs of the handicapped aboard their aircraft. The procedures could then be submitted to FAA, which would judge them as to their reasonableness and adequacy, and direct such changes as it thought were necessary for safety, or desirable in the public interest.

It was decided, therefore, to amend two of the FAR's--Part 121 and Part 135--to require that air carrier and air

taxi crewmembers receive special training in the evacuation handicapped persons in accordance with the procedures proposed in the plans of their respective airlines and approved by FAA. It was also decided that FAA would issue an advisory circular incorporating the results of agency research on the air transport of the handicapped and the best methods of taking care of them while they were aboard. Among other things the circular was to be devoted to a discussion of the problems faced by handicapped air travelers, and was to provide airline personnel with guidance on how best to handle the handicapped--how to seat them; where to locate their crutches and canes; how to handle the deaf, the blind, and the severely handicapped; and how, in general to order things so that a maximum number of the handicapped would be able to enjoy the benefits of air travel in safety and comfort.

The rule would not have the across-the-board application that FAA had proposed initially. But it would make it difficult for the carrier to deny passage to any handicapped person who met the reasonable requirements spelled out in the carrier's plan for the handicapped, as submitted to and approved by the FAA. In addition, the proposed rule would give CAB the operational backup it sought in

declaring policy and issuing regulations defining the rights of the handicapped.

The period closed with work proceeding on the proposed rule and the advisory circular which was to accompany it.

Civil Aviation Security

In the 4 years between 1969 and 1972, 117 scheduled U.S. air carrier were hijacked: 40 in 1969; 25 in 1979; 25 in 1971; and 27 in 1972. The United States had an answer to these outrages. In January 1973, FAA established the Civil Aviation Security Program under FAR Parts 107 and 121.538. Under the program the certificated air carriers and the airports serving them were required to have in effect security measures designed to prevent or deter the carriage of weapons, explosives and incendiary devices aboard certificated air carrier aircraft, and to prevent unauthorized access to such aircraft. They also made mandatory a number of related measure, all addressed to insuring a secure airport environment and safe air travel.

The effectiveness of the program was further enhanced by the Anti-Hijacking Act of August 1974, which incorporated many of the provisions in the FAR's which had started it off. The new law, (P.L. 93-366) amended the Federal Aviation

Act of 1958 and gave the Federal Government increased means to deal with hijacking and other acts of air piracy and sabotage. In addition to provisions involving the President, the Secretary of Transportation, and the Secretary of State, the act, under these amendments--

- o Made it a criminal offense for unauthorized persons to carry weapons and explosives aboard an aircraft.

- o Authorized the FAA Administrator to prescribe such reasonable rules and regulations as he deemed necessary to protect persons and property moving by air from acts of piracy and criminal violence. The Administrator was specifically directed to require the air carriers to refuse to carry persons unwilling to submit to personal search, or to carry articles which passengers did not allow to be inspected. He was also authorized to prescribe and keep in effect regulations requiring that passengers and property which were to be carried aboard an air carrier aircraft be screened by weapons detecting devices operated by employees of the carriers or their agents.

- Required operators of airports regularly serving air carriers certificated by CAB to establish an appropriate law enforcement presence at their respective airports to insure airport security and provide a law enforcement backup for the passenger and carry-on luggage weapons screening activity of the air carriers at those airports.

To put the program required under P.L. 93-366 into full operation, the agency in July 1974 established the FAA Civil Aviation Security Service, previously a part of the Office of Transportation Security, to plan, develop and implement the program. The strength of the service was set at 261 people, and its organization included a headquarters staff, regional staffs, and 33 local air transport security field offices (ATSFO's).

The security program evolved under the two FAR's and the 1974 hijacking act provided for a predeparture screening program which required that all airline passengers before being allowed boarding, be processed through weapon detection

devices, and that their carry-on luggage be searched or inspected by X-ray. Law enforcement officers were to be present at all screening stations to provide support to airline personnel engaged in the screening, and to ensure the availability of immediate law enforcement action if needed.

It was an extremely effective system, and completely turned things around as far as dealing with the hijacking menace was concerned. As compared to the 117 air carrier hijackings in the 4-year period 1969-1972, there were 12 attempted air carrier hijackings (only one of which was successful) in the succeeding 4-year perid. The system continued to keep all types of firearms, explosives and incendiary devices from being brought aboard the carriers--whether innocently by individuals who knew no better, or by would-be hijackers, who would have had no scruple in using them to take planes and passengers hostage if they could take the weapons and explosives aboard. The statistics of the screening activity indicate that of the roughly 490 million persons screened during the period, 1,946 were arrested for violation of law, including possession of firearms, explosives and incendiary devices, and 5,932 weapons, including hand guns, long guns, and explosives, as well as knives, cartridges, fireworks, ammunition, etc., in the tens of thousands, were detected and prevented from being carried aboard.

A total of at least 20 well-prepared attempts to hijack scheduled air carriers were thwarted by the screening system and allied security measures. In each case the would-be hijackers, whose intent to hijack the plane they were seeking to board was unmistakable, were arrested and brought to trial.

A total of eight U.S. aircraft were hijacked during the period. Six were general aviation aircraft, not subject to the security measures applicable to the air carriers; and two were carriers.

All six pilots of the hijacked general aviation aircraft, escaped with their lives; and all the planes, except for one which was set on fire and destroyed, were recovered. Two of the eight hijackers involved in the six hijackings were killed; and the rest, except for one man who escaped to Mexico, were brought to trial.

Two U.S. air carriers were hijacked during the period, but neither hijacking was due to a failure of the predeparture screening system. In the one case, the screening system was in no way involved; in the other case, the hijackers went through the screening process but used simulated weapons which they assembled while on board to gain control of the aircraft.

The first air carrier hijacking of the period occurred at San Jose, California, where an armed man holding two

hostages, boarded a parked air carrier aircraft and after taking two more hostages, shot and wounded one of them. With police units ringing the plane, the hijacker appeared at the top of the aircraft boarding stairs holding a gun to a hostage's head. Momentarily distracted by a police officer who ordered him to drop his gun, the hijacker pointed at the officer instead, whereupon a police marksman who had been laying in wait shot and killed him on the spot.

The second carrier hijacking of the period--the first successful hijacking of a scheduled U.S. air carrier since November 10, 1972, 45 months before--took place just as the period was drawing to a close. On September 10, 1976, five Croatian nationalist sympathizers resident in New York--four men and a woman--hijacked a TWA B-727 on its way to Chicago, a half-hour after the plane left La Guardia Airport. They did so by threatening to blow up the plane with harmless but extremely realistic looking "bombs" which they had put together in the lavatory from an assortment of innocent looking objects including pots, pans, black tape and play dough, that they had brought aboard on their persons and in their carry-on luggage. The subterfuge had been undertaken because the hijackers, after months of studying La Guardia's screening procedures, were satisfied that there was no way

they could bring real weapons aboard; and that their only chance of a successful hijacking was to improvise bogus ones, which they did.

The hijacker's principal demand--and the reason they had hijacked the plane in the first place--was for a following aircraft to drop propaganda leaflets on behalf of Croatian independence over cities in the U.S., Canada, the U.K., and France. The demand was complied with; and leaflets were dropped over Chicago, Montreal, New York, London and Paris. Finally, 33 hours after they left LaGuardia, the hijackers surrendered to the authorities at Charles DeGaulle Airport in Paris, their bizarre propaganda mission accomplished.

At that point it became clear not only that they had no weapons, but that they had never had any when they came aboard. Had the FAA known this, it would surely have called their bluff from the first. There was no faulting the agency, however, for having failed to do so in the hectic 30-odd-hours that the plane was under control of the hijackers. For one thing, no one except the hijackers themselves had any idea that it was in fact, a bluff; for another, they had been wily enough to leave behind them a real bomb in a subway locker in Grand Central Station, and to describe it when they took over the plane as identical with the "bombs" they had brought aboard. The real bomb, which was indeed where they said it was, went off when the New York police,

after removing it from the locker, tried to examine it. One officer was killed and three others were wounded; and no one after that questioned the authenticity of the bombs on the plane.

But whatever the twists and turns of this particular incident, one thing was clear: the predeparture screening system itself had not been at fault. The hijackers of the TWA B-727 took control of the plane by bluff alone and, as they well knew, could not possibly have brought real weapons aboard as long as they had to go through the screening process.

How to deal with still another basic threat to aviation security--the threat posed by hidden bombs and explosives in coin-operated lockers, checked baggage, cargo holds and cargo compartments--received close attention during the period. FAA had realized for some time that sabotage of this sort--because of the difficulty of locating the bombs in the first place--presented an even greater threat to security than hijacking, especially as it was now clear that successful hijackings were being prevented and deterred by properly applied predeparture weapons screening procedures. Since 1972, 132 people had been killed as a result of explosions

in lockers, at airports and aboard aircraft, and the menace was growing in step with the growth of terrorist activity throughout the world.

FAA had initiated the Explosive Detection/K-9 Dog Handler Team program in 1972 to deal with bomb scares and the detection of bombs hidden in airport areas and aboard aircraft, with excellent results. But this program with its specially trained dogs and expert handlers was not as effective as could be desired in detecting hidden explosives in checked baggage, especially in terminal areas with their many distracting influences.

Seeking a definitive answer to the problem, FAA had put its research and development echelon to work in developing detection equipment capable of automatically screening checked baggage for explosives. This R&D effort had been going on for some time and it was expected, as the period opened, that suitable scanning devices capable of doing the job swiftly and automatically would soon be available for the purpose. And it was just at this point, that the whole problem was brought into sharp focus by the explosion on December 29, 1975, of a high-intensity bomb in a line of coin-operated lockers at La Guardia Airport. Eleven people were killed, 54 were injured, and damage of close to three quarters of a million dollars was done to the airport.

This wanton act of sabotage caused an immediate nationwide furor. Taking the lead, the President established a joint Government-Industry task force made up of airline executives, airport managers, representatives of pilot organizations, and members of FAA and other Government agencies who were given the job of determining what had to be done to protect the public and the airline industry from further outrages of this sort. The task force made its recommendations and FAA quickly translated them into action.

Public lockers were closed, relocated, or otherwise secured; regulations were passed requiring the airlines to begin inspecting checked baggage; the pace of the ongoing R&D program to develop equipment capable of automatically detecting explosives in lockers, cargo holds, and cargo compartments was accelerated; the explosive detection dog teams used for the search of aircraft and airports for hidden bombs were increased from 18 teams to 24; and a test was undertaken to check the effectiveness of the dog teams in detecting bombs in checked baggage in crowded terminal areas. The FAA's aviation security training program was expanded, and special emphasis was placed on the study of countermeasures to deal with bomb threats and sabotage. In the wake of the bombing, FAA explosives security experts not only held training sessions for airport employees and others at the

country's 500 major airports, but conducted explosives security surveys at each of those airports to determine their explosives security needs and the countermeasures needed to properly take care of those needs.

In addition the agency issued two security alerts to airline and airport operators following the bombing, to ensure that they complied with established security procedures, especially as regards baggage and cargo operations. It also issued advisories outlining approved security measures for passenger and baggage screening, aircraft protection, and recommended responses to bomb threats, whether to aircraft, airports or cargo.

Public lockers were now much more secure than they had been. In addition to being relocated to areas where they were under constant surveillance, baggage brought to be stored in them could be searched and baggage owners required to satisfactorily identify themselves before being permitted to use the lockers. Additionally work was proceeding on the design of a locker capable of containing a bomb blast, though the effort was admittedly still in the development stage.

The screening of checked baggage by airline employees began effective April 15, 1976. Not all baggage was searched--only baggage which met selective screening criteria developed by FAA. Eventually, when automatic explosives screening devices become available for use, it might be possible to screen every piece of checked baggage, whether it was stored in a locker or taken aboard an aircraft and checked in a baggage compartment or cargo hold.

The day was not far distant when these automatic detection devices would be in use. FAA had already awarded contracts totalling close to $200,000 for test models of an X-ray system capable of automatically screening baggage for explosives which worked on the principle that explosives absorbed more energy than the materials usually found in a suitcase; and that sensors could detect this higher absorption. The system which had been developed by Westinghouse Electric worked automatically, ringing a bell and flashing a light when it detected something suspicious.

The device had other benefits in that it could be used to detect handguns and explosives hidden in carry-on baggage. In fact, it would be far superior for that purpose than conventional X-ray screening systems, because unlike

the conventional systems which displayed a picture of the contents of a piece of luggage and had to be carefully watched by an alert attendant, the device was fully automatic and gave visual and aural warning if the contents appeared to be in any way suspicious.

Three other automatic explosives detection devices, also being developed under contract, were in the prototype stage. While each was based on a different technological principle--one on vapor sensing, another on nuclear magnetic resonance, and the third, on thermal neutron activation--all were capable of doing the job; and it was now only a matter of time before a practicable device became available for commercial use. When this happened it would be of tremendous help in defeating this type of sabotage.

The complementary Explosive Detection/K-9 Dog Handler Team Program, whose task was to take care of bomb threats at airports and aboard aircraft, was also doing well. Eighteen major airports had dog teams in place when the period opened. Following the explosion at La Guardia, the Law Enforcement Assistance Administration (LEAA), which funded the program,

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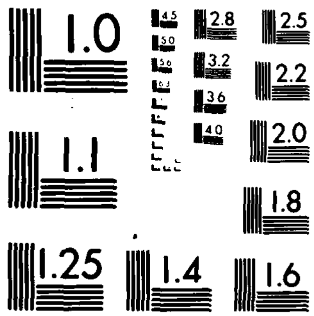

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

committed funds for six more teams, bringing to 24 the number of major airports in the country to have them as of the close of the period.

The complete plan called for 30 major airports, handling about 75 percent of the Nation's annual airline passenger enplanements, to eventually have this bomb threat search and detection capability. It was planned to have teams at all 30 airports by early FY 1977. This meant that by that time no en route air carrier in receipt of a bomb threat, would be more than a half hour's flight from an airport with a dog team capable of finding the bomb, if there was one aboard.

The dogs did not do as well as hoped in a 10-day test held during the period to determine their effectiveness in screening luggage in terminal areas. It soon became clear that the distracting voices, airflows and odors characteristic of the terminal environment made it difficult for the dogs to do their best job; and that the only real answer to the problem was the upcoming automatic explosives detection devices which were being specially developed for the purpose.

But if the dog teams did not fit too well into the terminal scene; when it came to their specialty--locating explosives in the airport complex or aboard aircraft--they were without peer. Their capability in this regard was again demonstrated by an official inspection by the Air Force, which had trained them in the first place, which showed the dog teams to have an explosive detection rate of 99.2 percent.

Nor did it detract from that record that late at night on July 2, 1976, an Eastern Airlines Electra was destroyed by a bomb while parked near a maintenance hangar at Boston's Logan International Airport. The explosive device, which had been placed between the Electra's strut and landing gear, detonated just minutes after an anonymous caller warned the airline that a bomb was about to go off in the area. There was a dog team at Logan which could have made short work of detecting the bomb and preventing the explosion if there had been time. But there had not been time for action of any kind. The bomb went off almost at once, destroying the plane and slightly injuring an airline supervisor who had gone aboard to check the log which fortunately was near the door and on the other side of the plane from the explosive.

Except for essentially unavoidable incidents of this sort, FAA now had all the bases covered as regards the twin menaces of hijacking and sabotage. It would still take time before the last bit of machinery required to combat them with full effectiveness was in place. But with or without that machinery there was no question of the agency's success in keeping the hijacker and the saboteur at arm's length where U.S. airports, and U.S. and foreign air carriers using them were concerned.

Civil aviation security training essential to the continued success of the aviation security program continued unabated during the period. The special training program for airport police went on as usual; and classes and seminars in emergency security procedures and aviation explosives security continued to be given to flight crews and ground and cabin personnel of the air carriers at major airports around the country. The 43 minute 16mm, colored motion picture film, "Explosive Devices--in-Flight Emergency Safety Procedures," prepared by the Civil Aviation Security Service, and available on long term loan to all the U.S. carriers, gained wide acceptance during the period. A total of 33 copies of the film had been bought outright as of the end of the period, and the sale of more was in prospect.

The Civil Aviation Security training course given since 1973 at the Transportation Safety Institute at Oklahoma City, graduated 350 students during FY 1976 and the Transitional Quarter. Of these 350, 259 were state, city and county police officers whose tuition and travel cost were funded by LEAA; 52 were security officers of the Federal government and the aviation industry; and 49 were foreign police officers. Total graduates since the course began numbered 1,422, 157 of them foreigners.

In addition, beginning September 15, 1975, when classes started, Civil Aviation Security personnel were enrolled in a new, two-week Compliance and Enforcement Procedures course given at the FAA Academy in Oklahoma City. The course, addressed to training FAA personnel in policies and procedures involved in securing compliance with the FAR's, dealt with such things as the proper conduct of an investigation and the documentation needed to support all types of compliance and enforcement actions. Members of the Security Service who had taken the course numbered 159 as of the end of the period.

Rulemaking was heavy during the period. In that span of time, the agency took the following aviation security rulemaking actions--

- Issued an NPRM proposing the complete revision of FAR Part 107, Airport Security. A principal objective of the proposed rule was to ensure a more flexible use of airport police and the establishment of higher standards in their qualification and training. The rationale behind this approach was that a more versatile and better trained law enforcement capability at the airports would materially enhance the ability of the aviation security program to deal with criminal violence and acts of air piracy.

- Issued numerous aviation security amendments to FAA Part 121, the regulation having to do with the certification and operation of the certificated air carriers. Under those amendments certificate holders were required to deny transportation to persons refusing to have themselves or their property searched for weapons prior to boarding; to limit the carriage of weapons on their planes to armed persons authorized to have them either while the aircraft was in flight, immediately before the flight

began, or after it was over; and, as an aftermath of the La Guardia bombing, to screen all checked baggage. In addition, as a part of their operational routine, certificate holders were to establish mandatory requirements applicable to the carriage of weapons in checked baggage and the bringing of prisoners and weapons aboard their aircraft by law enforcement officers.

- Amended FAR Part 129, effective October 9, 1975, requiring that foreign air carriers operating large aircraft to and from the United States in scheduled passenger operations, operate under security programs which would ensure that all passengers and property intended to be carried aboard their aircraft were subject to adequate weapons screening procedures prior to boarding. The regulation, as so amended, made the foreign carriers responsible for seeing to it that there was no unauthorized access to their aircraft; that no weapons, bombs or incendiary devices were carried aboard them unless authorized by the carriers themselves or their governments; that they took appropriate baggage and cargo security measures; and that they acted in accordance with Federal Aviation Regulations in dealing with bomb threats and threats of hijacking.

In addition, each foreign carrier was to provide the Administrator, upon his request, with information describing its security program and the way the program was being implemented.

- Further amended FAR Part 129, effective August 23, 1976, to require foreign air carriers to deny boarding to passengers refusing to permit their persons or property to be screened for weapons prior to boarding. The amendment further laid down that X-ray equipment in use by foreign carriers at U.S. airports had to meet minimum U.S. safety operating and detection standards. It also provided that the prohibition against bringing weapons aboard their aircraft would not apply if the weapons were in checked baggage and inaccessible to the passengers and the carrier had knowledge of that fact.

In other noteworthy aviation security developments, FAA--

- Adopted the Air Carrier Standard Security Program addressed to securing uniformity in air carrier security practices and procedures. The program, which became effective January 1, 1976,

was the result of a joint effort by the FAA Civil Aviation Security Service, the Security Committee of the Air Transport Association, and security representatives of the major airlines. The object was to insure uniform aviation security practices and procedures by all affected air carriers consistent with the requirements set forth in P.L. 93-336, and FAR 121.538. As of the end of the period all 32 of the Nation's major airlines had signed up for the program.

- Developed an operations specification under terms of which FAR Part 135 air taxi commercial operators could, if they wished to do so, adopt security procedures satisfactory to FAA, thereby greatly facilitating such of their operations as interfaced with those of the certificated carriers, and by that much adding to the security of their own operations.

- Issued advisory circulars outlining recommended aviation security measures for freight forwarders and supplemental air carriers. The freight forwarders were provided with information as to the security practices to be followed in consolidating shipments which would be carried thereafter by the certificated

carriers. The supplemental air carriers were similarly informed of security measures they could adopt voluntarily to minimize the threat of hijackers and saboteurs to the security of their operations.

Medical Safety Research

The effort here is directed to identifying and eliminating physical, psychological and physiological factors which jeopardize flight safety. The effort is also aimed at improving the application of aeromedical factors to aircraft design and operation in order to reduce accidents, injuries and fatalities. In this area, FAA, during the period--

- o Gave close study to a contract report prepared for it by the American College of Cardiology (ACC). The report reviewed a wide variety of heart and vascular

conditions and contained important state-of-the-art information on the relevance of these conditions to aviation safety. As such, it was considered a pivotal document in dealing with airman medical certification not only in the U.S., but also in the International Civil Aviation Organization (ICAO) and foreign countries. The ACC recommendations were being analyzed as the period closed with a view to determining the possible changes they would make necessary in the FAR's.

- Conducted a simulated study of pilot approaches and landings under nighttime conditions, using the international standard red/white visual approach slope indicator (VASI), and the instrument landing system (ILS). The data revealed that there was significantly lower precision on the part of the pilots under VASI control than under ILS control. This data were collected, and were to be used as a base against which the safety and effectiveness of other VASI systems under night flying conditions could be compared.

- Studied the oxygen needs of working flight attendants during a decompression. The results indicated that

for attendants of either sex, even mild to moderate exertion markedly reduced the time of useful consciousness. The study further showed that to remain conscious while exposed to decompression, attendants had to obtain supplemental oxygen within 15 seconds after the onset of the decompression. Recommendations for flight attendant procedures during a decompression were made accordingly.

- Had under consideration a Civil Aeromedical Institute (CAMI) proposal that older, general aviation pilots in their 70's and beyond, be subjected to relatively frequent medical examinations and proficiency checks. Studies were begun accordingly to determine what the period between medical examinations and proficiency checks should be for this age group. The studies were to include a statistical analysis of medical data obtained from airman medical certifications and a resume of those safety-related human attributes which were most likely to be affected by the aging process, and which it was considered essential to test frequently.

- Analyzed the results of a major study of cabin interior materials in terms of their potential

toxicity to aircraft occupants during on-board fires. The study which was conducted by CAMI involved laboratory rats and commonly used cabin materials. It used time-to-incapacitation measurements of the rats in testing the toxicity of the burning materials. The data, when integrated with other relevant information, were to be used in formulating new regulatory requirements for aircraft cabin interior materials.

- Addressed itself to the problem of determining optimum frequencies for the conduct of airman medical examinations. The determination was to be based on computerized data from airman medical examinations reports and a review of the medical literature on the subject.

- Developed a prototype optical scanner for routine clinical electrocardiograms to overcome variations in interpretations by screening cardiologists. In addition to reducing potential misreadings, it was expected that the new scanner would make it easier for the agency to keep abreast of the increase in pilot electrocardiograms forecast for the 1980's.

Safety Related Engineering and Developments

The emphasis in this program is to prevent accidents during the various stages of flight and to reduce their adverse effects when they do occur. The program whose objective is to enhance aviation safety, comprised four basic subprograms, including fire safety, transport safety, general aviation safety and aviation security. Consideration of these four, in the order given, follows.

Fire Safety. In this program, the effort was directed at reducing the severity of post-crash fires so as to increase emergency evacuation time in survivable accidents by reducing the cabin fire hazard and reducing in-flight hazards. The principal project areas in this program had to do with the following--

- Modified Fuel. This area, which concerned itself with research on fuels which had been jelled or otherwise modified to cut down their volatility and make them less flammable, included the following basic projects: (1) the conduct of fuel simulator tests to provide assurance that the use of this sort of fuel presented no major system compatibility problems; (2) the holding

of full scale tests to demonstrate that fuel so modified was effective in reducing the post-crash fire hazard; and (3) the development of a specification for it to serve as the basis for the design of system changes to resolve possible compatibility problems.

- Cabin Crash Safety. In this area FAA: (1) completed laboratory burn tests of currently used cabin interior materials and ranked the gases given off by them in terms of their relative toxicity; (2) undertook a fire management study which compared the relative merits of methods of preventing or controlling post-crash cabin fires; (3) investigated the partition geometry required to interrupt the spread of fires, including flash fires: (4) developed a computerized model capable of simulating cabin fire propogation, thereby making it possible to predict cabin flammability characteristics quickly: (5) tested the fire hazard potential of flight attendant uniforms in order to develop fire safety standards for garments of this sort; and (6) initiated plans for a permanent aircraft fire test facility which would enable the agency to determine the relationships of fire, smoke and toxic gases produced by burning materials, and to

use this data in establishing a method of laboratory test and analysis to deal with the problem.

- Inflight Fire Safety. There were two principle projects in this area: (1) the initiation jointly with the U.S. Air Force of an aircraft engine-nacelle fire test simulator capable of simulating the fire hazard and preventive systems of current engines and those envisaged through 1985; and (2) the design and development of a full scale, ground-based prototype of a nitrogen fuel inerting system. In addition, the hazard associated with the electrical charging propensity of fuel filters was investigated and defined.

Transport Safety. In this program, the effort was directed toward research and development in the areas of airworthiness, propulsion, and flight performance and operations. The objective was to provide a technical base for new or revised standards in these areas as new technologies emerged which had a high probability of being used in the next generation of transport aircraft. A summary of what those project areas had to do with, follows:

- <u>Aircraft Airworthiness</u>. Here, the agency initiated a computer program for the development of a standardized airframe inspection period. A project was also initiated for the development of crashworthiness analysis techniques which would make it possible for a designer to improve the capability of an airframe to suffer minimum damage during a survivable crash. The problem of determining the least dangerous place to put explosives discovered in flight, in this case on a DC-10, was also given close study during the period. The development of design methods and safety criteria for absorbing an explosion when the cabin was pressurized was also looked into. Scheduled for later study were the least risk locations to put explosives discovered in flight on B-707's and DC-8's.

- <u>Propulsion Airworthiness</u>. In this project area standards were developed for testing the fire resistance of engine components in an engine fire zone. In addition a study was made to determine what safeguards could be undertaken to withstand an engine rotor burst. Further projects planned for in this area were to be addressed to improving the standards for rotor burst protection; developing analytical methods

for determining the adequacy of rotor containment designs; and establishing new procedures for determining engine performance margins to reduce the number of surges, stalls and flameouts experienced in turbine engines.

- Flight Performance and Operations. Here the agency developed and validated a study of powered-lift, STOL performance and flight characteristics criteria, using ground-based flight simulation and test methods. In addition, it began to work on the development of airworthiness certification criteria for advanced transport technology, including related stability, gust and maneuver control and inherent stability augmentation.

General Aviation Safety. In this program the research and development effort was directed to working out ways of making general aviation crashes more survivable, improving flight safety practices, and enhancing pilot competence. The project areas comprised in the program were as follows--

- General Aviation Flight Safety. In this area, the agency completed the analytical and experimental flight test investigation of light plane stall

avoidance. It published results covering the critical performance and flight characteristics pertinent to certification criteria and provided recommendations for the form FAR's embodying them should take. It was planned to give further study to the engineering and human factors governing the design of light general aviation aircraft to ensure that effective pilot aircraft compatibility standards were observed.

- <u>General Aviation Crash Safety</u>. Here a mathematical technique was developed to analyze airframe responses to dynamic loads during survivable crashes. Effective techniques for predicting occupant seat restraint system responses to crash loads were worked out; and a project was initiated to determine methods to protect propeller blades from damage induced by fatigue.

- <u>Pilot Competence</u>. In this area an experimental stall/spin section was added to ground and flight training manuals, and the results were evaluated, using experimental and control group student pilots in doing so. A first year follow-up of the performance

of the pilots certificated under this program was planned for, and a concurrent effort projected involving an evaluation of the more innovative techniques used.

Aviation Security. As has already been seen, this aspect of safety-related development is directed toward the development of devices designed to prevent and deter hijacking and sabotage. Current emphasis is on the development from existing technologies of devices capable of automatically detecting dangerous objects such as hand-guns and explosives in carry-on luggage and checked baggage. The program is a continuing one and is interested as such in updating existing security devices and developing new ones. Flexible and pragmatic in approach, it is prepared to strike out in wholly new directions if the technology permits and if doing so promises to do the job better and more economically than before.

Other Aviation Safety Developments.

In addition to the foregoing aviation safety developments, FAA--

- Established the Office of Aviation Safety to act as staff advisor to the Administrator in aviation safety matters. The principal function of the new office was to provide the Administrator with a continuing

overview of aviation safety developments. The Office was also charged with the monitoring and management of specific safety programs which had an interface with other Government safety agencies including notably the National Aeronautics and Space Administration (NASA), and the National Transportation Safety Board (NTSB).

- Helped select Gregory G. Gorak, of Kenosha, Wisconsin, as Flight Instructor of the Year under the National Flight Instructor of the Year Program, cosponsored by the agency and the Flight Safety Foundation of the Aircraft Owners and Pilots Association (AOPA). Gorak, assistant chief flight instructor at the Gateway Institute at Kenosha, was selected for national recognition because of his outstanding record as a flight instructor, and the highly effective training methods he introduced at the institute.

- Issued an amendment to the FAR's permitting airmen to wear contact lenses in lieu of glasses for the correction of distant vision.

- Issued an NPRM requiring modification of the General Electric CF6-50 engines used on DC-10 aircraft, to

enhance their capability to withstand bird ingestion. The airworthiness directive the agency proposed issuing, required replacement of the epoxy material in the engine's shrouds with aluminum honeycomb.

- Conducted flight instructor refresher clinics at 105 locations in the U.S., using FAA Academy teams for the purpose.

- Convened the Terminal Instrument Procedures (TERPS) Advisory Committee, composed of representatives of all civil and military user organizations in the aviation community, to revise non-precision approach criteria and develop new instrument departure criteria for incorporation in the FAA/DOD, U.S. Standard for Terminal Instrument Procedures handbook. The effort, which was led by representatives of the FAA Flight Standards Service, was very successful and the new criteria were duly incorporated in the third edition of the handbook.

- Drafted an NPRM to establish navigation standards for U.S. aircraft on flights outside the U.S., which lay over under-developed land areas, or required extended overwater operations.

- Amended FAR Part 37, Technical Standard Authorizations, by deleting from the FAR, technical standard orders (TSO's) for obsolescent items including aircraft position light flashers, portable communications equipment, and landing flares. In addition, the amendment terminated the authority given to their manufacturers to mark them as TSO-approved.

- Clarified its ban on the use of portable electronic calculators on airlines or other aircraft operating under instrument flight rules. In an announcement early in the period, it stated that the rule did not apply to portable voice recorders, hearing aids, heart pacemakers, electric shavers or other portable electronic devices that the airline or the pilot in command determined would not cause interference with the aircraft's on-board navigational or communications equipment.

- Began testing VHF radio receivers installed on six lofty mountain peaks in Idaho, Oregon and Washington to determine how effective receivers at those heights were in receiving distress signals from the emergency locator transmitters (ELT's) of downed aircraft. Initiated on July 1, 1976, the test was to continue through the winter of 1976-1977, following which FAA would decide whether to continue the program or terminate it.

- Programmed $7.3 million in the FY 1977 budget to provide for the installation, as appropriate, of either distance measuring equipment (DME), or fan marker beacons and visual approach slope indicators (VASI's), at airports where non-precision approach procedures were in effect.

- Announced plans to revise and update FAR Part 25, Airworthiness Standards, Transport Category Airplanes, to bring the FAR in line with the state-of-the art and current aviation industry practice as regards fatigue problems in transport category aircraft. A notice of conference to deal with the matter as a first step in revising the FAR to deal with these fatigue problems was to be issued in early FY 1977.

- Initiated a program to provide frangible support structures for new airport approach light systems. The object was to minimize damage to aircraft accidentally coming into contact with approach light equipment. In addition, a program was undertaken to retrofit existing approach light systems to enhance safety during approach and landing operations.

- o Held public hearings on an NPRM having to do with the carriage of external loads by restricted category helicopters. Under the existing rules these helicopters, many of them Army surplus, were not permitted to carry external loads, and were limited to such special commercial operations as aerial application work and pipeline patrol. Under terms of the NPRM, they would be permitted to carry external loads on a commercial basis provided they met the safety requirements set forth in FAR Part 133, Rotorcraft External Load Operations. The object of the proposal was to bring all rotorcraft external load operators under Part 133, and to require them to meet the stringent safety requirements of the FAR to qualify for Rotorcraft External Load Operator certificates.

- o Established the Ambulance Standards Working Group to develop minimum standards for commercial air ambulance operations. The group held public meetings and listened to recommendations from private air ambulance operators and other members of the public with an interest in the matter. As the period closed an advance notice of proposed rule making was being

drafted, based on these recommendations and the results of an in-depth study conducted by the working group itself.

- Issued an NPRM to ensure that all large U.S. aircraft acquired under a lease or conditional sales contract received a thorough safety check before being permitted to take their first scheduled flight by their purchasers or lessors. Under the proposed rule the nearest Flight Standards District Office was to be notified at least 48 hours before the first flight was to take place, so that FAA would have time to accomplish the required check.

- Ordered the removal of side-facing flight attendant seats from all airline aircraft to provide an increased level of safety for flight attendants in crash situations. In issuing the order, FAA noted that flight attendants occupying side-facing seats would likely receive more serious injuries during a severe but survivable accident than passengers in forward-facing seats; and that those injuries might incapacitate them at a time when their help in performing emergency duties was most needed.

- Issued an NPRM proposing that FAR Part 91, General Operating and Flight Rules, be amended to permit the modification of the altitude alerting system in use in airline turbojet aircraft by eliminating the aural signal which sounded when the plane approached a predetermined altitude on ascent and descent. Instead, the warning would sound only when a deviation above or below the preselected altitude occurred and would not sound at all if the flight was flown correctly, thereby reducing by that much noise and clatter in the cockpit without reducing safety.

- Announced as the period closed, that all major U.S. air carriers had successfully completed a 9-month program to resolve the technical difficulties with the Ground Proximity Warning System (GPWS). Reliability problems with the GPWS became evident the year before when the carriers began installing the equipment--a sophisticated device designed to alert the pilots of the excessive descent rates and inadvertent flight into terrain. Because of a high number of false alarms and nuisance warnings, the deadline for the system's operational use was extended from December 1, 1975, to September 2, 1976.

During the "debugging" period, FAA permitted the carriers in certain instances to fly with the GPWS's either inoperative or removed; and it also permitted pilots to turn off the GPWS in flight when it malfunctioned.

- Circulated throughout the agency an NTSB report praising the FAA Central Region's stall/spin clinics for flight instructors. The report recommended that similar clinics be established nationwide to ensure better aerobatic training and safer aerobatics.

Chapter 3

THE AIR NAVIGATION AND AIR TRAFFIC CONTROL RESPONSIBILITY

The Federal Aviation Act of 1958, the agency's statutory charter, specifically charges FAA with seeing to it that the national airspace is put to efficient and equitable use, and that a common system of air navigation and air traffic control for both civil and military aviation is established and satisfactorily operated and maintained. The air navigation and air traffic control responsibility has a two-fold aspect. On the one hand, it requires the agency to promote the efficiency of air operations; on the other, to insure their safety. Compliance is one of the agency's major tasks, and rightly so since its proper discharge goes to the very heart of its mission to facilitate air movement and insure the safety of flight.

Air Navigation and Traffic Control: The Organizational Components

Meeting the air navigation and air traffic control requirements called for in the act falls on three specific FAA organizations: the Air Traffic Service (AAT), the Airway Facilities Service (AAF), and the Flight Inspection National Field Office (FINFO). The directors of AAT and AAF report to the Associate Administrator for Air Traffic and

Airway Facilities; FINFO, an echelon of the Flight Standards Service (AFS), to the Director of that service.

The three organizations complement each other functionally. The Air Traffic Service provides for the management of civil and military air traffic operating in the National Airspace System through its network of air route traffic control centers, airport traffic control towers and flight service stations. The Airway Facilities Service, in turn, provides the electronic technicians and other maintenance personnel whose task is to keep the ATC equipment in the towers and centers and the navaids at the airports and on the airways in working order. FINFO's contribution to the proper functioning of the system is no less vital. Using the agency's own aircraft and the latest in avionic inspection equipment, it checks the accuracy and effectiveness of the airway navaids and communications systems from the air to make certain that the air navigation system the Nation's pilots rely on is as precise and accurate as it must be if aviation safety on the airways is to be maintained.

The vast recources required to control traffic and instrument, operate, maintain and inspect the Nation's airways is illustrated by the following statistics:

o Of the 58,432 employees assigned to the agency on September 30, 1976, 39,284, or 67.2 percent of the total, were assigned to the operation, maintenance

and flight inspection of the overall air navigation and air traffic control system. Of these 39,284 employees, 25,632 were in AAT; 13,192 in AAF; 460 in FINFO.

- Air navigation and air traffic control facilities and FINFO aircraft in use throughout the system were valued at $1.02 billion as the period closed--the facilities, at $956 million; the aircraft, at $69.1 million.

- The cost of operating, maintaining and flight inspecting the overall air navigation/air traffic control system for FY 1976 was $1.25 billion. The figure was made up as follows: operating the ATC system, $779.24 million; maintaining the overall system, $400.1 million; providing it with installation and material services, $153.76 million. For the 15-month period, the total cost of operating the overall air navigation/ATC system was $1.8 billion. Of that amount, $982.76 million was for operating the ATC system; $508.81 million was for maintaining the air navigation/ATC system; $194.3 million was for providing the overall system with installation and material services; and $19.44 million was for providing it with flight inspection services.

While the work of AAF and FINFO is essential to the proper functioning of the overall air navigation and air traffic control system, that of the air traffic controllers in AAT is central to the discharge of the mission. For it is their responsibility to see to it that all aircraft, civil and military, operating in the National Airspace System are safely separated from one another--vertically and horizontally--and that their takeoffs and landings are equally safe, whatever the weather, the visibility, the traffic, or the time of day.

Air Navigation and Air Traffic Control: How the System Works

The VORTAC system is the principal navigation aid in use. It is a combination of civilian and military ground-based electronic navigational aids designed to provide reliable navigation information to aircraft using it. The basic civilian subsystem is the Very High Frequency Omnidirectional Range (VOR); TVOR at the terminals. This subsystem is built to an international standard and provides the pilot with the directional information he needs for safe flying in enroute, transitional and terminal airspace. In order to be completely functional a VOR system must also include a capability for the provision of distance information, making necessary the use of distance measuring equipment (DME). The military tactical and navigation (TACAN) system is essentially distance measuring equipment which meets civilian needs, coupled with additional navigational equipment

required by the military. When VOR and TACAN are co-located at one site, the combined system is designated VORTAC, while VOR equipment co-located with purely civilian DME is jointly referred to as VOR/DME. At the airports there are various types of landing aids, both electronic and visual. The standard electronic landing aid is the Instrument Landing System (ILS), which the agency hopes soon to replace with the Microwave Landing System (MLS). Also useful as a landing aid is the VOR or VOR/DME. In addition, non-directional low frequency radio beacons (NDB) are used at many locations for instrument approaches, position marking and direction finding.

The air traffic control system itself consists essentially of three types of facilities--airport traffic control towers (ATCT's) for terminal operations, air route traffic control centers (ARTCC's) for en route operations, and flight service stations for flight planning, pilot briefing, broadcasting weather, etc. The instrumentation that a given ATCT in the system will have depends, in general, on the density of the traffic it has to handle. The busiest terminals command the most sophisticated equipment; the less busy ones, equipment appropriate to their traffic load. There is no such differentiation in the instrumentation of the 20 ARTCC's in the system. The heavy traffic streaming ceaselessly past them, the long distances over which they must exercise control, and the need for long range, primary radar to do the job properly, makes it essential that each have the most advanced equipment available to accomplish its mission.

FAA-manned ATCT's in the system on September 30, 1976, totalled 447. Of that number, 180 provided radar approach control service of which 63--the 63 busiest--were computerized and operated ARTS III automated radar terminal systems, the most advanced electronic terminal gear available. In addition 71 other terminals where traffic density was less were scheduled to receive delivery of ARTS II equipment, a less complex automated radar terminal system.

The NAS En Route Stage A system, the computerized and automated system with which the air route traffic control centers are equipped, combines computers, long-range primary radar, and a secondary radar beacon interrogation system for use with transponder-equipped aircraft. Instrumented to speak an identical language, the computers in all the en route centers in the system process and relay flight data from center to center, and between the different sectors in each center. In addition the system's radar data processing (RDP) capability provides instantaneous readouts on its radar displays of an aircraft's identification, ground speed and altitude, and has shown itself to be readily adaptable to add-on software applications and refinements which serve to enhance still further the effectiveness of the system.

The ARTS automated radar terminal system provides for a no less effective level of automation. It combines in one system, airport surveillance radar, radar beacon interrogating equipment and automatic data processing equipment. The system is able to track transponder-equipped aircraft entering the 55-mile radius within which its surveillance radar is effective. It is also capable of giving instantaneous readings in alphanumeric form on the radar scope of the identity, position, ground speed and altitude of the aircraft tracked.

Developed over the years, the air traffic control procedures provide that, on departure from an airport, control of departing aircraft is handed off from the airport tower/ departure control to the nearest air route traffic control center, whose task, like that of the airport controller, is to keep it safely separated from other planes flying in the National Airspace System. As the flight progresses, control is transferred from center to center; and when the plane is ready to land, from the last center to control it, to approach control or the control tower serving the airport where the landing is to be made.

Positive Control Area (PCA), a feature of the air traffic control system, requires that all aircraft flying at the 18,000 foot level and above, be transponder-beacon equipped, fly under instrument flight rules (IFR), and be under

continuous ARTCC control. Aircraft flying on an IFR flight plan at altitudes below PCA receive the same air traffic control service as those operating in PCA. The difference is that aircraft operating in this strata are not required to have a transponder unless they plan on operating in a Terminal Control Area (TCA). Aircraft not operating in the IFR system are generally referred to as visual flight rules (VFR) aircraft. These aircraft generally operate without air traffic service unless it is specifically requested or when they are operating at an airport with such service.

The system also provides general aviation, military aviation and air carriers operating into uncontrolled airports with the service of the agency's flight service stations. These stations, with experienced flight service specialists in charge, provide pilots--and particularly general aviation pilots--with a variety of services. They give preflight briefings, advise on routes and altitudes, present and interpret weather data, broadcast changes in weather conditions and provide a direction-finding service.

As the Federal Aviation Act of 1958 requires, the agency backs the system with a wide variety of essential flight information services including the funding and

programming of aeronautical charts, maps and positional data, which pilots must have to plan their flights properly and conduct them safely. To make certain that maps and charts can be absolutely relied on by the aviation community, FAA cperates as part of the Air Traffic Service a completely automated flight data bank which collects, digests and presents daily the data chartmakers use in preparing them. The Air Traffic Service also takes care of the further problem of insuring that pilots and others involved in flight operations learn in time of significant changes which may affect the safety of flight, by collecting and disseminating Notices to Airmen (NOTAM's) both for flights within the United States and flights departing the country. In addition, it makes certain that the Government maps and charts, which are sold to the public virtually at cost, are attractive, well-designed and easy to use.

Air Traffic Activity: The Reporting Period and Beyond

Air traffic figures for the 15-month reporting period comprising FY 1976 and the transitional quarter were as follows--

- The ARTCC's handled 23.92 million aircraft flying under instrument flight rules during FY 1976, exceeding the FY 1975 total of 23.59 million by 1.4 percent. The centers handled 6.3 million more

IFR aircraft during the transitional quarter, bringing the total for the 15-month period to 30.22 million.

- The ATCT's handled 62.49 million takeoffs and landings during FY 1976, exceeding the FY 1975 total of 58.93 million by 6 percent. The towers handled an additional 17.20 million takeoffs and landings during the transitional quarter, bringing the total for the 15-month period to 79.69 million.

- Instrument operations at the towers during FY 1976 were 28.09 million, as compared to 26.06 million in FY 1975--a gain over the previous year of 8 percent. Another 7.7 million instrument operations were recorded at the towers during the transitional quarter, bringing the total for the reporting period to 35.79 million.

- The flight service stations and international flight service stations, and the FSS element in the combined station/towers, provided a total of 58.2 million flight services during FY 1976, a decrease of 0.1 percent over the previous period when the total was 58.3 million. In addition, 15.8 million flight services were provided during the transitional quarter. The FSS's, in all categories, contacted

9.8 million aircraft during FY 1976, and during the transitional quarter contacted 2.9 million more, for a total of 11.7 million.

Instrument approaches during FY 1976--1.51 million at the approach control facilities and 152,115 at the ARTCC's--were down 11 percent at the terminals and 20 percent at the centers as compared to FY 1975 totals of 1.69 million and 193,903. The decline can perhaps be best explained by the fact that flying weather had been unusually good all over the country during the fiscal year. This gave general aviation IFR aircraft, which might have chosen to be vectored in to a landing had the weather been poorer, the option of landing at uncontrolled airports or wherever without recourse to approach control.

During the reporting period, Civil Aeronautics Board certificated route air carriers had an inventory of 2,523 aircraft, including 2,126 jets, 261 turboprops, 119 piston aircraft, and seven helicopters. They flew a total of 6.09 million hours during the fiscal year and 1.56 million more during the transitional quarter, for a total of 7.65 million hours for the 15-month reporting period. They enplaned 211.8 million passengers during the fiscal year and 58.4 million more during the transitional quarter, bringing total passenger enplanements, domestic and international, to 270.2 million for the reporting period.

Revenue passenger miles for the carriers totalled 169.5 billion for the fiscal year and 46.2 billion for the transitional quarter, bringing the 15-month total to 215.7 billion revenue passenger miles.

Both commuter airline passenger enplanements and air cargo enplanements were up during the fiscal year--6 percent in the one case, and 1 percent in the other. During that time span the commuter airlines carried 5.9 million passengers, engaged in 2.3 million aircraft operations and flew 633.8 million revenue passenger miles. In cargo operations, the air carriers and commuters carried a total of 4.8 million tons of cargo, and flew 1.05 billion revenue cargo miles during the fiscal year.

General aviation aircraft in active use during the fiscal year, totalled 168,500 aircraft. Of this number, 137,500 were single engine aircraft; 20,300 were multi-engine aircraft; 2,100 were turboprops; 1,800 were turbojets; 3,800 were rotorcraft; and 2,500 were balloons, dirigibles, or gliders. An estimated 60 percent, or more than 100,000 aircraft, were equipped with IFR instruments, and the number of general aviation aircraft so equipped was rising. During FY 1976, the increase was more than 7 percent.

General aviation aircraft flew 35 million hours during the fiscal year and 9.5 million more during the transitional

quarter, bringing total general aviation flying time for the 15 months under review to 44.5 million hours. Of this total, single-engine aircraft in the fleet flew 31.7 million hours; multi-engine aircraft, 7.2 million hours; turboprop aircraft, 1.7 million hours; turbojet aircraft, 1.4 million hours; rotorcraft, 1.8 million hours; balloons, dirigibles and gliders, 700,000 hours.

Jet fuel and aviation gasoline consumed by U.S. civil aviation during the fiscal year totaled an estimated 8.769 billion gallons. Of this amount, the air carriers consumed 7.822 billion gallons of jet fuel and 20 million of avgas; general aviation, 499 million gallons of jet fuel and 432 million of avgas.

These, to say the least, were impressive figures. They reflected an overall air traffic activity that dwarfed anything known elsewhere in the world. To illustrate: Chicago O'Hare International Airport had more aircraft operations in FY 1976 than the combined operations of Heathrow Airport in London, Orly Airport in Paris, and Fiumicino Airport in Rome; Columbus, Ohio, a medium sized airport by American standards, had more operations than Tokyo and Athens combined; and the airports at Milwaukee, San Diego and Minneapolis, each had more operations during the year than Copenhagen, Amsterdam, Tokyo, Frankfurt, or Rome. Of the 12 airports in

the world with the most air carrier operations 11 were in the U.S.; and only Heathrow--which ranked 8th--was in the top 12.

But impressive as these figures were, a greatly increased air traffic activity lay ahead. Agency projections for the decade ahead indicated that the increase would be such as to make it necessary for FAA to expand its air navigation and air traffic control capability substantially if it were to keep pace with the demands those future increases would place upon it.

The projections covered a time span of 12 years, which is to say from the close of the reporting period to FY 1989. Indicators routinely used to measure air traffic activity were forecast to rise as follows--

- o Certificated air carrier enplanements, from 270.2 million to 400.5 million.
- o The air carrier fleet, from 2,505 aircraft to 3,130.
- o Air carrier flying hours, from 6.23 million to 7.81 million.
- o Commuter airplane enplanements, from 5.5 million to 10 million.
- o The general aviation fleet, from 171,600 to 267,000.

- General aviation flying hours from 36.7 million to 72 million.

- IFR aircraft handled at the centers, from 25.3 million to 40.5 million.

- Takeoffs and landings at the towers, from 62.5 million to 97.6 million.

- Flight services provided by the flight service stations, from 65.6 million to 120.1 million.

To cope with this expected growth in its air navigation and air traffic control activity, FAA planned to invest an additional $2.47 billion for air navigation and air traffic control facilities. The planned investment would be in the following functional areas: en route air traffic control facilities, $45.37 million; terminal control facilities, $742.3 million; flight service station facilities, $417.4 million; navaids, $195.5 million; landing aids, $421.2 million; housing and utilities, $142.4 million; aircraft, $56.4 million; development, test and evaluation, $58 million.

These facilities would be phased in over the 12-year period. When the capability was needed, it would be there.

Managing the Airspace

Representative airspace management activities of the period included the following--

- <u>The Terminal Control Area (TCA) Program</u>. A TCA is a controlled airspace normally extending from the surface to 7,000 feet with a radius of 20 nautical miles. TCA's were established to reduce the potential for mid-air collision in areas of dense traffic and high volume passenger loads at 21 of the Nation's busiest airports. TCA airspace provides room for climb and descent profiles and maneuvering and vectoring space for high performance aircraft, thereby enabling Air Traffic Control to positively control and separate them in the same way that they would be controlled and separated in high altitude positive control airspace.

  The 21 TCA's in operation during the period were in two groups made up of 9 Group I TCA's at major hubs and 12 Group II TCA's at lower volume airports. The Group I TCA's were at Atlanta, Boston, Chicago, Dallas/Fort Worth, Los Angeles, Miami, New York, San Francisco, and Washington; the Group II's, at

Cleveland, Denver, Detroit, Houston, Kansas City, Las Vegas, Minneapolis, New Orleans, Philadelphia, Pittsburgh, St. Louis and Seattle. FAA had authorized 42 Group III TCA's at even lower volume airports, but as of the close of the period, had made no decision to designate any of them as active TCA's.

Equipment and procedural requirements for operating in Group I TCA's were more stringent than for Group II TCA's. Aircraft operating in Group I had to be equipped with both automatic altitude reporting equipment and 4096-coded radar beacon transponders; aircraft operating in Group II had to have only 4096-coded transponders. Aircraft must obtain authorization to enter a TCA and maintain two-way communication with Air Traffic Control as long as they are in it.

A one-year test at the Atlanta TCA of a plan to reduce the collision potential in the layer of air-space between the 7,000 foot ceilings of the TCA's and the 18,000 foot base of Area Positive Control was completed during the period. The airspace of the TCA was expanded horizontally from the usual 20-mile radius to a radius of 35 miles, and the ceiling raised from 7,000 to 12,500 feet. The TCA

thus became subject to the rule that all aircraft in controlled airspace at 12,500 feet and above, had to have a coded radar beacon transponder and an automatic altitude reporting capability. The results of the Atlanta experiment were being evaluated as the period closed with the idea of preparing a policy statement seeking its wider application elsewhere in the NAS system.

- <u>The Terminal Radar Service Area (TRSA) Program</u>. This program was in effect during the period at 86 radar-equipped airports across the Nation serving 105 airports. Within each such TRSA, all aircraft on instrument flight plans are provided a standard separation from other aircraft on instrument flight plans, and from VFR aircraft that voluntarily participate in the program. The availability of the service, known as the agency's Stage III Radar Service, is publicized in the <u>Airman's Information Manual</u>. In addition to giving the checkpoints for contacting the towers, the manual gives the boundaries of the areas in which the service is provided. This radar service is particularly notable for the way it makes it possible for the 86 radar-equipped terminal facilities in the program to provide a separation service for VFR aircraft flying in a mix with IFR aircraft, by issuing them at their request traffic

advisories and vectoring instructions. During the period, more than 5 million VFR aircraft availed themselves of the service.

- <u>Schedule Restrictions</u>. During the reporting period FAA expanded for a further indefinite period the rule authorizing quotas at four high-density airports, namely: JFK International, Chicago O'Hare International, Washington National and La Guardia. It also continued for the sixth consecutive year suspension of the quota at Newark International, the fifth airport subject to the rule. The quotas in effect at the other airports were as follows: from 3:00 p.m. to 8:00 p.m. daily at JFK and O'Hare; and from 6:00 a.m. until midnight at Washington National and La Guardia. The quotas first went into effect in 1969 and except for Newark, where the quota was suspended the following year, had been continued ever since.

  The quotas at these four airports proved themselves extremely useful operationally. They made it possible to insure that during peak hours demand did not exceed capacity; that landing delays were never excessive; and that it was always possible to make an equitable distribution at those airports between air carrier, air taxi, general aviation and

military aircraft. The fact that the Newark quota was not in use was also a boon, since it provided users of JFK and La Guardia with a nearby alternative terminal during the hours that quotas at those two terminals were in effect.

- <u>The Air Traffic Control Performance Measurement System</u> In operation at 16 major airports during the previous period, the agency ATC Performance Measuring System (PMS) was expanded to eight more major airports during the period. In effect, the system compared airspace capacity with actual operations during peak hours as a way of identifying problems holding down traffic flow. Keyed to the system were its Engineered Performance Standards (EPS's), which, in addition to providing a tool for measuring runway capacity and serving as an index of airport performance, were also found to be extremely useful in managing national air traffic flow. The system was also being used to develop an automated delay measurement mechanism capable of yielding precise arrival delay data. The delay measurement system was being tested at Chicago O'Hare, and eventually, if everything went well, was to be established at other major airports.

- <u>Area Navigation (RNAV)</u>. The existing VOR/DME navigation system is basically a straight line, radial

route system limited to available radial routes. However, VOR/DME stations provide basic bearing and distance information which, when processed by an airborne computer, permits precise navigation along any selected route covered by these stations. The result is area navigation (RNAV). Area navigation makes possible the addition of routes as needed; the restructuring of the national airspace; and depending on its phasing, a substantial reduction in the number of stations in the VOR/DME network.

During the period FAA issued a comprehensive policy statement on RNAV. In the statement, the agency made clear that while it recognized the advantages that RNAV offered, there appeared to be no pressing requirement for the system in the immediate future.

Meanwhile, the agency emphasized it would lose no time in taking positive steps to promote its use within the existing air navigation and air traffic control environment. For the long term its intention was to develop a master route structure and transition plan capable of effectively bridging the gap between the existing air navigation structure and the RNAV structure of the future. This would take time and require close and continuous coordination with all aircraft users before the system could be fully implemented.

The statement noted that there were already a number of high altitude RNAV routes in operation and that more were in prospect. It made clear, however, that until more airlines were convinced of the need for it and fully certificated avionics and effective approach facilities were available for its use, it would be some years yet before RNAV came into its own as a principal navigational component of the National Airspace system.

- Obstruction Evaluation and Airports Airspace Analysis. This permanent program is administered at the FAA regional level. The Air Traffic and Airports divisions are the regional staff sections primarily concerned, but the two of them have the assistance as needed of their regional Flight Standards and Airway Facilities, counterparts. The program applies to any airspace use, but most frequently to the use of airspace in the terminal area. On the obstruction evaluation side, it seeks to insure the integrity of usable airspace by determining whether surface objects, actual or proposed, will adversely affect it. The same procedure is followed on the airports airspace analysis side, except that the effect of airport operations is entered into the analysis as a factor in the situation.

  Although obstruction findings when made are essentially advisory in nature, the public generally complies

with them without question. In the few cases where it does not, indirect incentives insure compliance. For instance, a finding that a 90-foot chimney on a power plant would be no hazard if it were lighted, got quick action from its otherwise recalcitrant owners when they discovered that their insurance would go sky high if they failed to provide the required lighting.

The period was a busy one as far as the program was concerned. A total of 12,000 cases were processed under it, with virtually no difficulty in securing compliance with the agency's findings.

o <u>The Military Operations Areas (MOA) Program</u>. The object of this program was to make it safer for civil aircraft, and especially VFR general aviation aircraft, to travel or operate near military training areas during such times as the Air Force was using them to conduct combat maneuvers, intercept operations, acrobatic maneuvers, etc. The previous way of handling the situation had been to conduct this type of training in Charted Intensive Service Jet Training Areas (ISJTA's), and uncharted Air Traffic Control Assigned Airspace (ATCAA) areas. This way of doing the job did not work too badly in the case of ISJTA's but the ATCAA's were a source of constant trouble. General

aviation VFR pilots would fly unknowingly into the uncharted ATCAA's while the military was absorbed in its combat exercises, and would often have a hard time getting out safely.

To overcome this difficulty it was planned to do away with both the ISJTA's and ATCAA's, and to replace them with charted Military Operations Areas (MOA's). The areas would be activated only during the time that the Air Force was actually conducting training operations in them and would be available for the use of civil pilots when it was not. Flight service stations in the vicinity of the MOA's would provide their users with information as to when they would or would not be used for military purposes, and provide instructions on what to do to transit or circumnavigate them when they were. There would be no firing in the MOA's; and transiting them, while requiring the exercise of a more than normal degree of caution, would, in general, be non-hazardous. The program, which envisioned the activation of approximately 200 MOA's in the country, was on the point of being implemented as the period closed.

- <u>Helicopter IFR Petroleum Exploration Operations</u>. An FAA Helicopter Task Force devoted a great deal of

study during the period to determine what to do about establishing a safe and reliable air navigation system to serve the needs of IFR helicopters operating coastally and to oil rigs at sea in the Texas-Louisiana-Gulf of Mexico area, and to a lesser extent, off the eastern Atlantic Coast and Alaska. There were already several controlled special-use airways in operation in the Gulf of Mexico and the Northeast Corridor between New York and Philadelphia, and similar activities were in prospect in offshore areas in southern Alaska and in the Gulf of Alaska. But the navigational system in use--a very low frequency VOR/TACAN system, with non-directional beacons--was found to be unsuitable for the job in terms both of cost and operational efficiency.

After establishing this to be the case, the task force studied the possibility of using Loran-C or Omega navigational systems in its place. It determined that Loran-C would not be able to provide satisfactory coverage of the Gulf of Mexico area for at least several years, and was not sure that Omega, the other alternative, would operate satisfactorily as part of the National Airspace System. It therefore began a series of exhaustive tests in early 1976 to determine whether Omega could be used for this purpose.

The tests were proceeding as the period ended. No final conclusion could be drawn, but it was already clear from those that had been completed that Omega was capable not only of supporting proposed coastal and overwater operations, but, in all likelihood, would also work well in tandem with existing NAS navigational components. The tests were to be completed in November 1976, following which a final decision would be made in the matter.

- The Hawaii-West Coast Composite Route System. In May 1976, the agency implemented on a 6-month trial basis six great circle routes between Hawaii and the U.S. mainland, in place of the previous four essentially parallel routes. The increase to six routes was made possible by the use of composite separation procedures which permitted a lateral (side by side) separation of as little as 50 miles, as long as the aircraft were not at the same altitude and had at least a 1,000-foot vertical separation. The change permitted route and flight level assignments which were expected to cut fuel consumption by up to 9 million gallons of jet fuel annually.

  As the period closed it was already clear that the expected fuel savings would not only be realized but

exceeded. Also, since the same separation procedures had long been in successful use in the North Atlantic, there appeared to be no good reason why the system should not be made permanent. It was expected, therefore,--subject to eventual ICAO approval of the change--that this would take place when the test was completed in October.

Center and Terminal Automation

The program to establish the NAS En Route Stage A system by computerizing and automating the operations of 20 FAA centers in the contiguous 48 states was completed in August 26, 1975. On that date, the radar data processing capability of the Miami ARTCC, the last center to acquire such a capability, was formally commissioned by Acting Administrator Dow in ceremonies at the center.

In his remarks the Acting Administrator pointed out that the agency now had a well-articulated, nationwide electronic en route system which could be augmented, refined, and if need be, even more fully automated to handle the generations of en route traffic to come. Instead of getting vital flight information in large part through radio contact with the aircraft they were tracking, and entering it on flight strips which they had to move manually across their radar display with each new report, the en route controllers

now had an integrated computerized electronic system which gave them an instantaneous readout on their radar displays of an aircraft's identity, position, ground speed and altitude--all the information they needed to guide them in the en route controlled airspace for which the center was responsible.

In his remarks at Miami the Acting Administrator had taken particular note of the refinements to the system that were still to come; and even as he spoke, the first of them was already at hand. This was the conflict-alert system--an add-on computer system capable of flashing a warning signal on the controller's radar display, alerting him to a less than standard separation between aircraft flying in the en route airspace over which he had surveillance. The system gave the controller 2 minutes notice that aircraft he was tracking were on courses that were potentially in conflict It did so by causing the data tags on the radar display of the aircraft involved to blink and the words CONFLICT ALERT to flash on beside them on the display. Alerted to the danger, the controller had time to radio one or both pilots, giving them new headings or altitudes sufficient to keep them safely separated.

The initial implementation of the conflict alert program, to provide a conflict alert capability at 18,000 feet and

above, was implemented at all the centers by January 1976. By September 30, 1976, the end of the period, all the centers had implemented the program to a height of at least 12,500 feet and above, except for the New York center where it was in effect at 15,000 feet and above. The Atlanta center was operating the program at 8,000 feet and above; and the Memphis and Jacksonville centers--the first to succeed in doing so--were operating it from the ground up. All 20 centers were expected to have a from-the-ground-up capability by mid-1977.

Also as a direct outgrowth of the state-of-the-art improvements made possible by the NAS En Route Stage A program, the Great Falls, Montana center closed down on July 6, 1976, after 34 years of service; and its control area was taken over by the Salt Lake City and Minneapolis centers.

In the terminal automation program, 63 ARTS III systems were operational at the end of the period; 61 in the contiguous 48 states, and two--one at Honolulu, and the other at San Juan--outside the continental limits. The ARTS III's at Dallas/Fort Worth and Atlanta, the last two of the 61 units in the contiguous states to go into operation, did so in August 1975 and August 1976, respectively. The ARTS III at Atlanta, the last of the 61, replaced an ARTS I--the first prototype ARTS--which had been in operation there since 1965.

One of the great strengths of the ARTS system was its adaptability to add on computer-driven improvements, enhancements and refinements. A contract for the first such improvement had been concluded in July 1974. It called for such hardware and software changes as would give all ARTS III's a minimum safe altitude warning (MSAW) capability.

The computer-activated MSAW is a versatile device, which, when set up, will continuously monitor the terrain separation of any transponder-equipped aircraft it is tracking. The MSAW will compare the plane's altitude, heading and position with a terrain map stored in its memory bank to see that the plane is in no danger of crashing into the ground or striking obstructions in the landing area. In addition when the aircraft is on final approach, the MSAW will compare its altitude with the glide slope to determine if it is about to dip too low for safety. If it is in imminent danger of crashing into the ground, or is coming in too low for safe landing, the MSAW will cause a blinking "LOW ALT" to appear on the radar screen and a buzzer to sound in the radar room. Warned that he was too low, the pilot would be able to pull out in time to avert a crash.

The device took time to develop. The prototype was tested by NAFEC at Atlantic City and at Stapleton Airport at Denver, following which a number of changes had to be made in the production model. The basic problem was adapting the prototype to the

unique topography and instrument approach configuration of the two airports at which it was tested. This was finally accomplished and the first operational system was received at Los Angeles International Airport in September 1976, just as the period was closing. It was expected that this warning system would be in full operation at all ARTS III sites by the spring of 1977.

To improve the capabilities of the ARTS III system still further the agency awarded a $24.3 million contract in July 1976, calling for the development of other computer-based programs. These were to include: insuring that immediate corrective action was taken when aircraft were detected to be on *converging* courses; a metering and spacing program which would insure the even flow and spacing of aircraft arriving and departing the terminal; the automation of messages received as a result of the conflict prediction and metering and spacing functions; flight data handling improvements which would make flight strips of any kind unnecessary; and the digital remoting of ARTS III data to the control towers of satellite airports. Delivery of these various enhancements to the basic system was to begin in mid-1977.

In August 1976, the agency awarded a further contract, this time for $36.6 million for four specially automated ARTS III's and the further improvement of the 63 existing

ARTS III's. Of the 63, 34 of the less busy ones were to be equipped with a continuous data recording and playback capability. The remaining 29--the 29 busiest--were to be converted to an ARTS III-A configuration, which would give them in addition to the data recording and playback capability, two further significant enhancements: a fail-safe system which would enable them to continue operating in the event of component failure; and continuous radar tracking capabilities for tracking both transponder and non-transponder equipped aircraft.

As for the four specially instrumented ARTS III's also provided for under the contract, one was an ARTS III-A system, which was to be installed in the New York terminal radar approach control (TRACON) facility, for which ground had just been broken on a 15 1/2 acre site at Mitchel Field, Long Island, New York. The New York TRACON was to replace the Common IFR Room at John F. Kennedy International Airport. In addition to other advanced capabilities, it would be able to process the flight data from airport surveillance radars at five airports in its operating area, whose approach control functions it would take over.

Finally, the contract provided for ARTS III type, en route automated radar tracking systems (EARTS), for installation at three of its overseas air route centers, namely:

San Juan, Puerto Rico; Anchorage, Alaska; and Honolulu, Hawaii. The three EARTS systems were scheduled to arrive at their respective overseas locations by the spring of 1978.

As its name suggested, the EARTS was essentially an ARTS III modified for en route operations. A major difference between the two systems is that EARTS would come with an NAS En Route Stage A type Plan View Display (PVD) system in place of radar scopes and radar screens in use with the ARTS III.

The EARTS earmarked for Anchorage would replace a simplified prototype of EARTS, which had been installed there in late 1974. Consisting essentially of an ARTS III computer, other ARTS III components and an NAS En Route Stage A PVD display system, it was used in conjunction with the Murphy Dome long-range radar near Fairbanks, whose signal had been remoted by landline to Anchorage and provided the Fairbanks area with a remote service that eliminated the need for an en route center. This made possible the shutdown in January 1975, after 31 years of operation, of the Fairbanks center, and the takeover of its functions by the Anchorage center. A single Anchorage sector, with the help of the modified ARTS III equipment and inputs from the Murphy Dome radar, was all that was needed to control the traffic previously handled by Fairbanks.

Building on this successful experience, the secondary radar at Deadhorse, Alaska, was remoted to Anchorage late in the period. This eliminated the need to man the tower at Deadhorse. The tower was shut down and the controllers detailed there were returned to Anchorage.

Progress was also made during the period in the procurement of the ARTS II, a less complicated type of ARTS programmed for installation at 71 radar equipped airports whose traffic volume does not warrant the more highly automated and much more costly ARTS III. Designed to take advantage of the latest mini-computer and integrated aircraft technology, ARTS II would provide controllers with a direct digital readout of the identity, heading and altitude of transponder-equipped aircraft in their operational areas. The ARTS II would also record and receive flight data from adjacent National Aviation System (NAS) En Route Stage A centers. Unlike the ARTS III, however, it would not compute or display an aircraft's ground speed. On the other hand, its modular design is such that it can be instrumented to perform most of the rest of the ARTS III functions.

The ARTS II procurement was delayed during the period because of technical difficulties with the contractor and his subcontractors. The revised delivery schedule now calls for the first of the 74 ARTS II systems to be delivered in May 1977 and the last in May 1980.

The period closed with the people at the terminals scheduled to receive the ARTS II's first already at work planning for their installation. Most were thinking in terms of using BRITE radar in the cab (TRACAB), hoping thereby to obviate expensive building modifications and the construction of special radar rooms to house the new equipment.

The ARTS and NAS En Route State A computer software programs--no less than the basic systems themselves--were part of the agency's Upgraded Third Generation (UG3RD) air traffic control system--a grouping of R&D projects in various stages of development addressed to the upgrading of the ATC system to insure its being able to meet the challenges of the 1980's and beyond.

Enhancing the Center Function

The previous period saw the completion of a $50 million ARTCC expansion program calling for the construction of buildings and other needed facilities. The new buildings provided room not only for the automated NAS En Route Stage A system equipment and its electrical and mechanical support systems, but also for administrative offices and other

related functions. The buildings and their associated support activities were part of a continuing drive by the agency under UG3RD to insure that the centers were thoroughly modernized, had the best equipment available and were operating in an efficient manner.

In actions of the period, addressed to further enhancing center operations, FAA--

- o Completed the turnkey installation at all of its air route facilities of the Central Control Monitoring System (CCMS), a centrally located computerized system for the control and monitoring on a turnkey basis of center mechanical, electrical, electronic and fire alarm systems.

- o Completed the commissioning at all of its air route centers of power conditioning systems (PCS), devices designed to provide each center with an uninterruptible supply of power in the event of a commercial power failure. Because it cuts in stored power immediately when the normal power source falters and continuously provides precise, regulated power, irrespective of the quality of input power, the battery-powered PCS gives constant protection to the versatile but delicate electronic hardware in each center from the surges, dips and "brown-outs" experienced with commercial power. Its role

is even more crucial when the power fails completely. At such time, its banks of batteries begin supplying full power instantaneously and automatically, and continue supplying it until such time as the center's emergency, engine-driven electrical generators can be turned on, or commercial power resumed. The first PCS was commissioned at the Los Angeles ARTCC in September 1974; the 20th and last, at the Jacksonville center in September 1976.

- Awarded a $1.43 million contract for 81 additional power conditioning systems which were to be installed at dual and triple radar microwave links (RML's) receiving signals from two or three long-range primary radars and transmitting them to the ARTCC's. The power conditioners, performing essentially the same functions as in the centers, would insure that in the event of a commercial power failure, the RML's would continue to transmit their vital information to the centers without interruption until emergency generators could take over, or commercial power was restored.

- Began final procurement of 220 VHF/UHF En Route Back-Up Emergency Communications (BUEC) systems for the 20 air route centers. The transceivers were to be installed at various remote sites to provide an

emergency air/ground capability in the event the primary system failed.

- Awarded a contract for the acquisition of a Direct Access Radar Channel (DARC) subsystem to be installed at all 20 air route centers to provide a backup capability for the primary radar data processing computers in use at the centers. Using mini-computers and other related electronic equipment, the DARC subsystem would have the capability of taking over and operating the radar data processing system when the existing full-size RDP computers either failed or were shutdown for scheduled maintenance. When there was such a failure or shutdown the controllers would not have to fall back on broadband radar to continue operations. Instead, their radarscopes would continue to display information on the identity, position and altitude of the aircraft that was available when the primary RDP computers were functioning. The first DARC subsystem was scheduled to become operational in December 1979; the last, in July 1981.

- Established the En Route Dynamic Simulation (DYSIM) Program for the training of student radar controllers at the centers. The implementation of the NAS En Route

Stage A radar data processing system made it necessary for the centers to have the capability of simulating all the functions of an operational control sector in training student controllers. At first the training was given in the operational sectors themselves. But this did not work out well, since there was no choice but to scrub the training when the operational system began to be overloaded. It was soon realized that the student controllers learned much faster when they were not involved in the operational sectors, and that it was clearly in the agency's interest to provide them with special training quarters where the operational problems could be simulated and the learning process go on without interruption.

A high priority project was established in 1975 to implement special DYSIM training laboratories in the 20 NAS En Route Stage A centers which would be physically separated from the operational sectors and, except for their function, be undistinguishable from the operational sectors. At the end of the period each center had an effective DYSIM capability, though not all had the required laboratories. Three ARTCC's were operating with

complete training labs; six had labs which were complete except for sectors communications; and the remaining 11, which expected to have their labs in operation not later than mid-1977, were conducting their DYSIM training at sectors that had been installed for expansion but had not yet been activated.

- Awarded a 3-year, $1.4 million software development program to increase the capabilities of the NAS En Route Stage A system. Development and testing of the new program was to be accomplished at FAA's National Aviation Facilities Experimental Center (NAFEC) at Atlantic City. Types of development planned for the 20 domestic centers under the contract included software changes needed to take care of flight plan conflicts, minimum safe altitude warnings, conflict resolution and en route traffic metering.

- Put into operation at all the centers the computerized Airway Facilities Service Maintenance Automated Reporting System, MARS-1, for the collection and dissemination of information on the maintenance of en route center facilities in the National Airspace System. Using the computers already in place at

the centers, the system collected and distributed as needed, essential maintenance information for the use of center maintenance technicians.

The New York TRACON: The Shape of Things to Come

Ground breaking ceremonies took place at Mitchel Field, Long Island, New York, on July 29, 1976, for a new terminal radar approach control (TRACON) facility to replace the existing Common IFR Room located at the John F. Kennedy International Airport (JFK) at Jamaica, N.Y. Commissioned in September 1968, the Common IFR Room combined under one roof the approach control functions at Kennedy, La Guardia and Newark Airports, and 16 of their satellite airports. While the Common IFR Room was capable of handling upwards of 3,100 daily flight operations, a study of what was to come in the 1980's had led to the conclusion that a new and larger facility was needed to handle the ever increasing volume of air traffic projected for the New York metropolitan area.

The new TRACON was to be equipped with the latest, expanded and enhanced automated radar terminal system--the ARTS III-A, which the agency ordered in a contract concluded at virtually the same time as the ground breaking at Mitchel Field. It was to be staffed by 265 air traffic controllers and 185 engineers and maintenance technicians. The TRACON

would provide both radar and non radar traffic services for aircraft operating within a 50-mile radius of New York City. The facility was to be equipped with three 550 K.V.A. emergency electrical generators and would have an appropriate power conditioning system.

Basic flight data would be received from each of the five airport surveillance radars located at JFK, La Guardia, Newark, Westchester County and Islip MacArthur Airports respectively, and would be processed and fed to 30 radar displays in the facility. Following a precedent set by the TRACON at Chicago O'Hare, the New York TRACON would have a fully instrumented and specially set apart radar simulation laboratory for the training of its student radar controllers. In addition, its maintenance technicians would have four radar displays set apart for their exclusive use.

The two story facility would have a 75 x 100 foot operations room and an avionics equipment room beneath it of the same dimensions. The operations room would house in one place the radar controllers for JFK, La Guardia, Newark, Westchester County and Islip MacArthur, as well as for a dozen lesser airports. The latter would include, among others, Bridgeport and New Haven, Connecticut, satellites of Westchester Airport; and Brookhaven and Farmingdale, satellites of Islip MacArthur.

It would be a much larger operation than before. The Common IFR Room had logged more than a million operations in FY 1976. But the new TRACON, with its additional airports and their satellites, was expected to handle at least two million operations a year when it finally opened for business.

Described as a terminal that looked like a center, the TRACON, as an ARTS III-A facility, would have a primary radar tracking system capable of tracking and processing every target in its airspace and not just targets with a secondary radar transponder capability. It would also have a fail-safe capability which would enable it to operate with only a slight reduction of efficiency in the event of component failure. In addition it would have all the rest of the ARTS III add-on computer features, including among others, conflict alert, conflict resolution and minimum safe altitude warning capabilities.

The New York TRACON was expected to begin receiving its first ARTS III-A components in the spring of 1978. Installation of the equipment would follow and take about a year to complete. In the meantime operational techniques would be developed; the system would shake itself down; personnel would be indoctrinated; and provisions made for system support. The cutover from the Common IFR Room at Kennedy to the new facility at Mitchel was expected to take place in late 1979.

Other System Improvement Efforts

During the reporting period, FAA--

- o Commissioned 39 of the new ASR-8 airport surveillance radars (ASR's). The ASR-8 incorporated such advanced features as a Klystron transmitter tube, expanded low angle coverage, solid state design and modular construction. It had double the power output of earlier radars and a greatly improved light aircraft detection capability. In addition 40 ASR antennas for terminal radar improvement purpose were contracted for during the period.

- o Field tested and commenced the installation at Washington National Airport of the first open planar array radar beacon antennas for use with the air traffic control radar beacon system (ATCRBS). The open mechanical structure and large vertical aperture of the new, open array antennas enabled them to increase the coverage of aircraft transponder signals by greatly reducing false radar beacon targets caused by ground-reflected signals. The first 10 antennas of this type were due to be delivered under a $1.07 million contract by the end of 1976. The agency expected to buy 150 more in FY 1977.

- Contracted for the purchase of 1,000 solid state power supply units for 51 of its 87 long-range air route surveillance radars (ARSR's). The new solid state components were to replace vacuum-type equipment which had a high failure rate.

- Completed design of the ARSR-3 long-range air route surveillance radar, the most advanced long-range radar available. Designed for use in high-density traffic areas, the new ARSR-3's embodied many improved features, including improved antenna design, solid state construction, built in test equipment and a clearer radar picture of the weather and aircraft being tracked. Delivery of the first system was scheduled for the first quarter of FY 1978, with subsequent deliveries at the rate of two a month.

- Completed the installation of 42 additional approach lighting systems (ALS/MALSR). This brought the total of these systems to 480. This ALS/MALSR equipment was used in conjunction with the instrument landing system (ILS) as a visual aid for runway approaches.

- Awarded a $1.9 million contract for 255 instrument landing system (ILS) modulators. The equipment was to be used to process and distribute signals between

the transmitter and antenna of the ILS. The new modulators would replace older obsolete equipment still in use.

- Contracted for 93 BRITE systems and 83 additional displays for use in airport tower cabs. The BRITE (bright radar indicator tower equipment) system is a 16-inch television-type radar display with sufficient brightness, contrast, and resolution for use in the high and variable light levels inside airport tower cabs. The BRITE systems were to be installed in towers scheduled to receive airport surveillance radar whose traffic did not justify the cost of a separate radar room.

- Modified existing airport surface detection (ASDE) radars with a BRITE display to compensate for their lack of definition--a deficiency which complicated the task of the controllers in maintaining effective surveillance of the airport surface and the positioning and transit of aircraft on it. In addition to the use of BRITE displays to overcome the difficulty, an improved NU-BRITE system was being evaluated at JFK, San Francisco, and Chicago O'Hare Airports. Plans were also underway for the development of a wholly new surface radar to replace the ASDE.

- Began the conversion of 152 Light Intensity Approach Lighting Systems with Sequence Flashers (ALSF-1) to the new Short Simplified Approach Lighting System (SSALS). It was estimated that the conversion, which was to be completed by July 1977, would result in a 30 percent reduction in energy consumption at each of the 152 lighting facilities concerned.

- Installed 58 Visual Approach Slope Indicators (VASI's), bringing total VASI's in the system to 284. The VASI provides a visual indication of the proper approach angle to the runway.

- Commissioned 48 full Instrument Landing Systems (ILS), 13 partial ILS systems and 10 glide slopes. In addition the agency contracted for 57 more full ILS's, 52 more partial ILS's and 13 more glide slopes. Delivery of this equipment was to begin in FY 1977. FAA had 542 full and partial ILS's in service at 409 U.S. airports as the period closed. The ILS, the agency's principal airport landing aid, was a precision approach device that provided a path for the exact alignment and descent of an aircraft on final approach to a runway.

Modernizing the Flight Service System

There were 292 flight service stations in the Flight Service System with an authorized staffing of 4,653 flight service specialists at the end of the period. The stations contacted 12 million aircraft and provided more than 74 million flight services during the reporting period. They served the entire aviation community, including the air carriers and the military, but their largest customer by far was general aviation, which had in operation at the end of the period approximately 170,000 aircraft.

The system, which was little changed since the 1940's, was highly labor-intensive and, in general, required the flight service specialists to provide pilots in need of them with weather briefings and assistance in flight planning and flight plan filing on a one-to-one, face-to-face basis. System equipment was old and obsolete, and weather data, distributed by teletype, was displayed on clipboards, much as it had been 30 years previously. Some of the stations were already finding it difficult to meet the demand for flight services with their available personnel; and with demand for flight services expected to double by 1985, and to almost triple by 1990, the system clearly needed to be reorganized and modernized.

The agency estimated that to take care of projected needs, with the system as it was, would require a staff of 17,000 flight service specialists by 1990 and a corresponding expansion of buildings and equipment. Not only would increased costs for personnel alone exceed $200 million a year, the service provided would not be as good as it had been.

A joint DOT/FAA task force was established in 1971 to study the problem. The task force specifically recommended the establishment of a number of centrally located flight service hubs possessing an automated preflight weather briefing and flight plan filing capability, and connected by telephone with remotely located terminals, from which the users could telephone their requests. The hubs, operated by the flight service specialists, would provide the users at the terminals with the desired weather and flight plan information, and take care of their flight plan filing needs. This would remove altogether the need for direct, personal contact between flight service specialist and pilot. It was estimated that cumulative savings which could run as high as $672 million by 1990 could be realized by the agency if the existing outmoded way of doing things was replaced by such a system.

The plan tentatively envisioned 20 semi-automated flight service hubs, each hub co-located with a CONUS air traffic control center. Cathode ray tube video displays would replace the clipboards and information called up automatically at the hubs and processed there by the flight service specialists could be quickly made available to the users at the terminals.

Under such a system, weather and flight plan information could be provided and flight plan filing arrangements concluded for the most part on an automated basis. This would

result not only in improved service and increased safety to users, but would also save the agency an immense amount of money.

The agency adopted the recommendation and ordered the development of an automated flight service system capable of the desired results. In June 1972 the agency awarded contracts totalling $2.8 million for the development of a prototype Aviation Weather and NOTAM system (AWANS).

The first prototype AWANS was delivered to the flight service station at Atlanta, Georgia, in April 1975. The device was linked remotely with a smaller flight service station at Macon, Gerogia. The new system employed minicomputers to collect, store, retrieve and display alphanumeric and graphic weather and flight plan information. By typeing appropriate messages on keyboards at their positions, the specialists could, in a matter of seconds, call up specific weather and flight plan information on their video display screens and use the information to prepare briefings and process flight plans which could be relayed immediately to remoted terminals or other satellite hookups.

The prototype was a success. It vastly increased the productivity of the system and was enthusiastically received by the flight service specialists assigned to the Atlanta and Macon facilities.

A second AWANS was ordered in January 1976; and in February 1976, a first step was taken in the establishment of the new system. The Washington, D.C., flight service station at Washington National Airport was co-located and consolidated with the air route traffic control center at Leesburg, Virginia. The object was to demonstrate that the co-location of a flight service station with an ARTCC was feasible and that other nearby flight service stations could similarly be co-located at the Leesburg center.

In April 1976, the agency put into operation at the Leesburg flight service station a leased, off-the-shelf video display system which had originally been developed for ARTCC use and had a limited automation capability. It was planned that this off-the-shelf system known as the Meteorological and Aeronautical System (MAPS) would be replaced by the AWANS contracted for in January when it became available. It was also planned that in due course,

the Leesburg facility would take over the functions of the flight service stations at Richmond and Charlottesville, thereby affording at the one site the flight services previously provided at Washington, Richmond and Charlottesville.

By this time the agency had in being a planned-for time table for the modernization of the Flight Service System. It was to be accomplished in three phases: a near-term, interim phase (1976-1980); an intermediate, baseline phase (180-85); and a long-term, enhancement phase (1983-1986). The object was to provide an orderly transition from the existing, labor-intensive system to the highly automated system envisioned in the basic plan.

In the near-term, interim phase, the emphasis would be on immediate improvements to the existing system. The improvements would not only reduce the need for the existing system's one-to-one ratio, but also make the provision of flight services easier and faster. They would include closed circuit television, faster flight-plan filing and recording, the establishment of direct request and reply teletype circuits for weather information and improved pilot automatic telephone weather answering and transcription services.

In the intermediate, baseline phase, the agency would begin implementing the 1971 DOT/FAA study with strong emphasis on the Atlanta AWANS experience. The overall service would be configured to include 20 automated flight service hub stations co-located with the ARTCC's. These would interface through a central Aviation Weather Processor (AWP) with the agency Weather Message Switching Center at Kansas City, and provide the hub stations with up-to-the-minute weather data. As the hubs went into operation, they would take over the functions of the numerous flight service stations surrounding them, permitting the latter to be phased out and closed down.

In the long-term enhancement phase, the emphasis would be on the incorporation into the system of a computer-generated voice response system and direct access devices. These would eliminate the need for the flight service specialists to serve as middlemen between users and data and would permit them to use their time more productively than before. If everything went as planned, it could be expected that the ever-growing demand for flight services could be met with virtually no increase in staff.

Other UG3RD Developments

Other important projects of the period in this category included the following--

- Discrete Address Beacon System (DABS). This is a long-term ATC modernization program for the development of advanced sensors and transponders which will ultimately replace the existing air traffic control radar beacon system (ATCRBS). In this system an airborne transponder transmits an aircraft's identity and altitude when interrogated by an ATCRBS interrogator located at an en route or terminal radar facility. Its shortcoming is its relative inability to separate transponder replies from aircraft in the same immediate vicinity. The result is an overlapping and garbling of transponder replies from all the aircraft in the area. DABS, on the other hand, is highly selective in its interrogation. As its name implies, its address is discrete, and triggers answers only from the specific aircraft it is seeking answers from. Because it has this capability, DABS, when fully implemented, will provide a data link that will enable ATC computers on the ground to automatically generate a warning to pilots that their aircraft are following courses that are potentially in conflict. This capability

will also make it possible to allocate to each transponder-equipped aircraft in the country a unique identity code, making instant communication with it routine.

Long under development by the agency, DABS reached an advanced stage during the period with the award in February 1976 of a $11.9 million contract for three engineering model DABS/Intermittent Positive Control (IPC) sensors, and 30 transponders and related equipment. Delivery of the models and transponders was expected to be made to NAFEC in FY 1977, when exhaustive tests of the system would begin.

- The Mid-Air Collision Avoidance Program. During the previous period the agency tested three candidate mid-air collision avoidance systems, including an Airborne Collision Avoidance System (ACAS), an Intermittent Positive Control (IPC) Collision Avoidance System, and a Beacon Collision Avoidance System (BCAS). The tests were completed during the period; and following an analysis of all the separation assurance alternatives, the agency chose as the most feasible of the three the Beacon Collision Avoidance System.

  It did so for two principal reasons: the affinity of the BCAS for the existing air traffic control radar

beacon system; and its high level of transponder implementation. With this decision in hand, it chose two versions of the BCAS for development: one, with the capability of interrogating aircraft and processing their replies independently of ground-based air traffic control systems; the other, dependent on a ground-based surveillance and interrogation capability. The results would be known in a later period.

- <u>The Wake Vortex Avoidance System (WVAS).</u> Wake vortices, strong rotating gusts of wind which trail behind large jet aircraft on approach and landing, not only present a definite danger to following aircraft, especially smaller ones, but also serve to cut down airport capacity because of the need to maintain large spaces between landing aircraft. As a first step in dealing with the problem, preliminary tests involving thousands of measurements of the phenomenon were conducted at New York's Kennedy Airport, London's Heathrow Airport, and Denver's Stapleton Airport. The tests established that there was a relationship between specific measurements of wind speed and wind direction and the approximate times vortices could be expected to form on the runways.

On the basis of these findings, a vortex advisory system (VAS) was developed which consisted essentially of a computer capable of predicting the behavior of the vortices when its data base, consisting principally of wind measurements collected in the runway area, clearly indicated their imminent development. A prototype VAS was installed at Chicago O'Hare International Airport late in the period, at which time feasibility tests of the system began.

Initial results were excellent. In addition to providing the controllers with wind direction, wind velocity, and gust information, the VAS successfully predicted when the vortices were likely to remain in the approach corridor, and alternatively when the runways could be expected to be free of them. When the tests were completed, action would be taken to put the O'Hare installation on an operational basis.

- The Microwave Landing System (MLS). This system, which FAA first began developing in the early 1970's using a time-referenced scanning beam (TRSB) technique, is one of the key elements of the agency's Upgraded Third Generation (UG3RD) air traffic control system. The MLS can provide--as the existing Instrument Landing System (ILS) cannot--the precise, flexible, and

reliable landing guidance required to match the operational procedures and capacity of the Upgraded ATC system developed for the needs of the 1980's and beyond. The difficulty with ILS, which is based largely on the technology of the 1940's, is that it can provide flight path information for only one approach path, thereby limiting airport capacity and exacerbating noise and congestion at the terminals. Terrain, structures and other obstructions interfere with its signal, and with only a limited number of frequency channels available, it lacks capacity for future growth.

The MLS suffers from none of these limitations. The system makes possible an improved approach and landing capability ample for the needs of both civil and military aviation well beyond the year 2000. Its guidance capability will range from a straight-in, single-path approach for simple needs, to a three-dimensional wide-angle capability for segmented or curved approaches. It will allow close spacing of parallel runways, make possible the use of more effective noise abatement procedures and permit automatic landings on closely spaced runways under all weather conditions. It will also reduce site preparation and flight inspection costs and will be able to operate

effectively at sites where, because of obstructions or other reasons, the ILS cannot operate at all.

The agency had spent more than 24 months developing the system when the period opened. Following the award in July 1975 of contracts totalling $14.2 million, FAA began taking delivery in June 1976 of two sets of prototype MLS's--one, a basic, narrow system for use at air carrier airports; the other, a small community system for use at general aviation airports. As the period closed, the prototypes were undergoing tests at NAFEC and at a NASA facility in California, with FAA, NASA, and military personnel all taking part in the testing.

The agency had meanwhile submitted its MLS to the International Civil Aviation Organization (ICAO) as the U.S. candidate for consideration as the international MLS standard. The system was demonstrated to ICAO's All Weather Operations Panel just as the period was closing. The panel's assessment was to be completed in November 1976 and submitted to ICAO's All Weather Operations Division in early 1977. A final decision on the selection was expected by the following year.

o <u>The Aeronautical Satellite (AEROSAT) Program</u>. It had been recognized as far back as the 1960's that existing high frequency (HF) communications and air traffic control arrangements in the North Atlantic while adequate for the existing traffic would not be able to provide proper communications support for the vastly increased air traffic forecast for the late 1980's and beyond. There was general agreement that a stationary satellite system offered the best technical solution to the difficulty since such a system would resolve the communications problem, permit reduced separation between overseas flight tracks, and result in substantial savings. In August 1974, the United States, Canada, and the European Space Agency (ESA), representing nine European countries, established a joint international program to put two experimental satellites in geostationary orbit over the Atlantic to permit the relay of voice and data link messages to and from transoceanic aircraft and provide an independent surveillance capability.

The U.S. plan was to install its own avionics in FAA facilities and in participating U.S. airline aircraft, which would communicate to and through the satellites with a ground station located at NAFEC. In addition

there would be intercommunication between airline dispatch centers, the National Weather Service and the agency's air route traffic control centers.

In March 1976, in an answer to a request for proposals, the space segment owners--the Communications Satellite Corporation (COMSAT), Canada, and ESA--selected an international group headed by the General Electric Company for the negotiation and award of a contract for the development of the satellite program. The time table, as drawn up at the time, called for the first AEROSAT statellite to be launched in late 1979, for an experimental AEROSAT program to be inaugurated in 1980 and for full operation to begin in late 1993 or early 1994.

Flight Information Service Developments

Section 307(b) (3) of the Federal Aviation Act of 1958 authorizes FAA "to arrange for the publication of aeronautical maps and charts necessary for the safe and efficient movement of aircraft in air navigation, using facilities and assistance of existing agencies of Government so far as practicable." The function so called for is to provide FAA and the aviation community with flight information services

essential to the safety of flight in the NAS. As such it is one of the agency's most essential activities.

The FAA organization in charge of the function is the Flight Services Division, an AAT unit in headquarters with flight information, NOTAM and cartographic responsibilities. The division includes the National Flight Data Center (NFDC), the central point for the collection and validation of all U.S. flight information data.

A completely automated data bank, NFDC, provides updated information on the status of all operating components of the NAS, disseminates a daily data digest for the use of aeronautical chart producers, and manages the central NOTAM facility for both U.S. and International NOTAMS. Through its Cartographic and Standards Branch, the division designs, programs and funds for the aeronautical maps and charts required by the flight information services program; and the National Ocean Survey (NOS) of the Department of Commerce, the Federal Government's principal civil mapping and cartographic service, produces them under FAA control and subject to its specifications. The maps and charts so produced are given an internal distribution to all FAA activities in need of them, and are available to the public from NOS and privately owned sales agencies established at principal airports around the country.

The arrangement under which FAA designs, programs and funds the maps and charts required in the program, and NOS produces them to FAA specifications, goes back to the Air Commerce Act of 1926, when what is now NOS was then the U.S. Coast and Geodetic Survey (CSGS), and what is now FAA, the Aeronautics Branch of the Department of Commerce. In one of the first organizational actions taken under the act, a section of the Coast and Geodetic Survey was detailed to begin preparing aeronautic charts for the Aeronautics Branch--a function that its successor, the NOS performs for U.S. civil aviation to this day.

The list of currently available aeronautical maps and charts produced under this arrangement is very extensive. It is constantly being added to by the agency. Its activities in that behalf, during the reporting period, are described in what follows.

A principal problem of the period, was the need for precise, digitized positional data to take care of the increased automation of the agency's air traffic control facilities and the introduction of the latest ground and airborne systems into the NAS. The agency began providing the digitized data during the period in the following automated areas:

- <u>The Minimum Safe Altitude Warning (MSAW) Program</u>. By the end of the period, three of the Nation's 63 ARTS III equipped terminals had received the positional data needed for the proper functioning of the MSAW program. To get it required the accession of a vast amount of terrain data from NOS; the abstraction by hand from available charts of certain required positional information; and the merging of automated obstruction and obstacle data from charts available in NFDC and NOS files. Support for the remaining 60 ARTS III terminals and for the pending ARTCC en route MSAW program will require even more data, which will have to be acquired by means of photogrammetric, digitizing, satellite radar, airborne radar operations, and new ground survey techniques.

- <u>The Instrument Approach Chart Automation (IAPA) Program</u>. Support of this program, whose data needs were essentially the same as those of the MSAW program, was marked by an intensive design and system effort on the part of NFDC to provide the capability for the proper support of the roughly 4,000 IAP's in the system.

- <u>The Semiautomated Flight Inspection (SAFI) Activity.</u> The need for precise, digitized information on radar locations and the location of other navigational facilities to meet the needs of FINFO's new SAFI equipment was

taken care of during the period with the help of NOS airport obstruction field survey parties. This made it possible for the swift, high-flying SAFI aircraft to pinpoint the locations of radars and other essential navigational facilities during the course of their inspection activities.

- <u>The Radar Video Plate Software Program.</u> The benefit of Radar Video Mappers installed at the ARTCC's and ARTS III terminals is that they make it possible for the controllers to call up instantly radar video images of maps, charts, overlays, etc., and to replace them just as quickly with images of other charts, maps and overlays. This has made it necessary for NFDC to provide greatly increased support to the terminals and centers possessing this equipment. The need was principally for precise, digitized positional data showing section boundaries, intersections, obstructions, obstacles, etc.

In a particularly notable development of the period, the agency and the Department of Defense began consolidating and streamlining their respective NOTAM systems preparatory to merging both types of NOTAMs into a single civil-military system. Steps taken by the National Flight Data Center,

which was in charge of the FAA effort, included a reevaluation of NOTAM issuance criteria, the consolidation of individual service procedures into a single agency handbook, and the merger of NOTAM summaries with weather summaries to simplify pilot briefings. NFDC also began taking over International NOTAM functions previously performed by certain of the the international flight service stations; and, as the period closed, had under consideration a plan to expand NOTAM distribution to the flight service stations as soon as the FSS's received upgraded terminal equipment capable of receiving the data properly.

In keeping with a long-standing subsystem development effort, NFDC continued with the development of the final phases of its Instrument Approach Procedure Automation plan, and the development and testing of an airway/route subsystem plan to support ARTCC, ARTS and FSS requirements, IAP requirements, and NOS automated chart requirements. In addition to using its data base for other purposes, NFDC developed a number of computer-generated publications, including, among others, Parts 2 and 3 of the Airman's Information Manual, the Location Identifier Handbook, and the Air Traffic Service Fact Book.

Cartographic publications produced and evaluated during the period included--

- A prototype 5" x 10 1/2" airport directory developed for the Southeastern U.S., which contained all airport information to be found in Parts 2 and 3 of the AIM. The prototype, which was envisioned as one of seven volumes covering the United States, was well received, and the majority of users evaluating it, preferred it to the AIM. Production of the seven-volume series was scheduled to begin in FY 1977.

- An experimental World VFR Radio Navigation Chart showing reduced geographic detail and consisting essentially of an overprint of the low altitude, en route airway facilities to be found in the areas charted. Its purpose was to take care of the needs of an increasing number of VFR flights in which the pilots tended to rely more on tuning in to IFR radio navigation facilities than on the arts of pilotage. The chart's potential was being evaluated as the period closed and a decision on what further to do with it was expected in FY 1977.

- A prototype planning chart portraying high-speed military training routes, air route traffic control boundaries, etc. It was to be, in effect, a larger "wall-size" version of the familiar Flight Case Planning chart, developed by NFDC in 1974 to ease the burden of

the visual pilot in planning his flights. The easily used flight case chart, as small as 5" x 10" when folded, showed the pilot the VOR's, the distances between them, cities, terrain features, restricted areas, and other essential features which had to be taken into account in planning the flight. The new, larger "wall" planning chart, which actually would not be that much larger when folded, was to be published in FY 1977.

Improving Central Flow Control Automation

The agency began a developmental program during the period tc substantially improve the automation of its central flow function. Since its establishment in August 1969, the Central Flow Control Facility (CFCF), a principal component of the Air Traffic Control Systems Command Center (ATCSCC) in FAA headquarters, had used leased computers on a time-sharing basis in the discharge of its flow control responsibility. In doing so, it had to rely for the most part on static data available from the Official Airline Guide (OAG), as well as NAS data, of whatever kind, relevant to the flow control process. The new program--officially known as the Air Traffic Control Systems Command Automation Program--was made possible by the fact that the ARTCC at Jacksonville, Florida, had outgrown its old IBM 9020A computer

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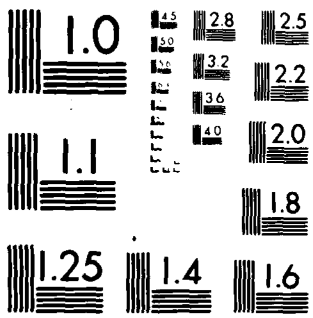

MICROCOPY RESOLUTION TEST CHART
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and was about to replace it with a new, faster, and more powerful IBM 9020D.

The 9020D was due to be delivered at Jacksonville in November 1976. When it was, the 9020A would be moved to a special building of its own in the Jacksonville ARTCC complex. Central Flow Control's authorized nine programmers would be assigned to the Jacksonville operation, and the computer would be linked with FAA headquarters, all 20 CONUS ARTCC's, and FAA's Weather Message Switching Center at Kansas City.

The data base used in the operation would be specifically tailored to the needs of the Central Flow Control process, and to a degree not possible before, would deal with real time, rather than static data. The basic concept underlying the operation was the introduction and integration into the OAG scheduled data base of actual departures, real-time cancellations, and other similar changes as they occurred. Under this concept, Central Flow Control would know at any given moment what IFR aircraft were in the air, where they were, and where they were going. With precise information of this kind in hand, it would be able to adjust the flow on a real-time, mistake-proof basis, rather than having to settle for static information which might or might not be true depending on how many unreported changes had taken place in the interim.

Nor would this exhaust the data that the full-time use of the Jacksonville computer would make possible. The data would also include such things as current traffic load summaries, airline listings, delay predictions, operator inputs, and as a basic part of the concept, data base updates of every kind, including actual departure times, real-time cancellations, unscheduled changes, maintenance delays, weather diversions and other similar changes as they occurred.

The basic concept was simple. It called for the timely introduction and integration of actual departure times, real-time cancellations, and other similar changes into the scheduled data base. The concept was to be applied initially to 15 major airports designated as "pacing" airports, because such delays as were encountered from time to time in the system usually originated there. The extensive, in-depth, real-time data collected at those airports would be especially valuable in smoothing out the traffic flow across the Nation and insuring that delays and congestion were kept at a minimum throughout the system.

A computer program design for such a system was completed during the period. In addition, an RFP (request for proposals), backed by program specifications developed within the facility, was issued for the development of the

software equipment needed to bring the new, real-time automated system into operation. The contract was to be awarded in early 1977 and initial operation of the system was to begin in late 1978.

Weather Developments

In this area, FAA--

- Gave a high priority to a program to automate the tracking and dissemination of aviation weather observations by means of the Aviation Automated Weather Observation System (AV-AWOS), a completely automated and highly cost-effective weather observation system. The AV-AWOS will use standard meteorological sensors to automatically measure wind, temperature, dewpoint, cloud height, and visibility. The data will be fed into a computer, and the result will be automatic weather observations which the pilot will secure in the form of voice broadcasts. The broadcasts will be available to pilots, controllers, and flight service specialists by simply tuning a frequency, and to others in the airport area by telephone or speaker. It was hoped that in due course an industry-built AV-AWOS, based on a model developed by the National Weather Service for FAA, would be ready for field test.

- Approved the continued assignment to the Kansas City ARTCC of a seven-man weather staff made up of a National Weather Service forecaster and six Air Force forecasters. The function of this staff was to provide en route civil and military pilots flying under control of the center with a completely current severe weather forecasting service based on incoming pilot reports (PIREPS) and weather radar readings provided by the center. In addition the staff provided an after-dark forecast service to Air Force bases in the vicinity of Kansas City, making it possible for the Air Force to close all of its weather facilities in the area at night, with a notable saving of money. The Air Force-NWS staff was initially established at the ARTCC in June 1975 on a year's test basis. The service it provided was so well received during the period that the program was extended for another year; and the three participating services--FAA, NWS and the Air Force--began considering plans for the establishment of similar teams at other ARTCC's around the country.

- Implemented its long planned-for En Route Flight Advisory Service (EFAS) at 44 flight service stations across the country, thereby putting into full effect a program which first went into experimental

operation at four flight service stations on the West Coast in 1972. According to plan, all 44 stations were equipped with remote communications outlets and operated on a discrete frequency of 122.0 MegaHertz, which was to be used exclusively for the receipt and transmission of weather data. The stations were manned by specially trained EFAS flight service specialists who, after receiving real-time weather data from the best available sources, passed it on to pilots tuning in on the discrete EFAS frequency. The service permitted the pilots almost instantaneous information on en route weather conditions, whether from pilot reports (PIREPS), actual radar weather data from a radar scope, computerized facsimiles from a remote scope, or from direct lines to National Weather Service forecasters, who could provide expert information on developing or changing en route weather conditions. The system encouraged en route pilots to make frequent reports to the EFAS specialists on the discrete frequency and to describe weather conditions actually encountered for the benefit of other pilots flying in the same area. In addition it made it possible for pilots listening in on the frequency to hear the other reports and if they desired to request other available weather information.

The agency's En Route Flight Advisory Service was intended to improve flight service station coverage around the country on an interim, near term basis. The projected 20-hub automated flight service system would come later.

- Substantially improved the provision of weather service in the Pacific. After incorporating Alaskan Weather Circuits A, C and O into the Weather Message Switching Center (WMSC) at Kansas City during the previous period, the agency proceeded to take similar action looking to the improvement of the weather service in the Hawaiian Islands. Under the system prevailing at the time, international weather traffic reached the islands via the National Weather Service's computers at Suitland, Maryland; Military traffic via the Air Force's weather computers at Carswell Air Force Base, Texas; and U.S. domestic traffic via the WMSC's computers at Kansas City. As a result, weather procedures in Hawaii lacked uniformity and differed in a number of important respects from those in effect on the mainland--just as the year before, weather procedures in Alaska had differed from those in the CONUS.

  In mid-1976, FAA, with the cooperation of the National Weather Service and the Air Force changed this. A

new system was established in which the weather computers at Suitland and Dallas sent their respective Hawaiian weather products to Kansas City, leaving it to the weather message switching center there to relay the traffic to the islands. This made it possible to standardize Hawaii's weather operating procedures to conform with those in effect in the other 49 states and resulted in a much improved U.S. weather service in the Pacific.

- Began a 5-month test of a new procedure for alerting pilots to thunderstorms occurring within a 30-mile radius of five of the Nation's busiest airports. The test was to run from June through November 1976, and to involve La Guardia, John F. Kennedy, Newark, Washington National, and Philadelphia International Airports. Under it, radar observers at the National Weather Service stations at Patuxent River, Atlantic City and New York would notify the FAA Central Flow Control Facility (CFCF) in Washington when they spotted a strong thunderstorm within 30 miles of any one of the five airports involved in the test. Central Flow Control would pass on the information to the appropriate FAA air traffic control facilities for relay to pilots flying in the affected areas to enable them to avoid the thunderstorm area.

- Initiated a long-range research and development program to determine the best way to improve the capability of terminal and long-range radars to: (1) detect on radar scopes and radar displays weather hazardous to flight and (2) develop techniques to improve the ability of the controllers to interpret radar weather data. The immediate emphasis was on improving the detection of thunderstorms by finding better ways to measure their reflectivity. For the long term the effort was to be directed toward the detection of the actual turbulence rather than its reflectivity.

- With the cooperation of the National Weather Service, which provided them, began supplying certain of its ARTCC's with facsimile pictures of thunderstorms.

The procedure was for the Systems Command Center at FAA headquarters to receive the facsimiles from the National Weather Center at Suitland and send telecopies to six of the ARTCC's, namely, the centers at Atlanta, Boston, Chicago, Cleveland, Indianapolis, and Leesburg. The pictures were to be used in helping en route pilots avoid severe weather.

- o Formulated a new, nationwide standardized form for pilot reports (PIREPS) which was to be implemented jointly by the agency, the National Weather Service, and the Department of Defense, effective October 15, 1976. PIREPS--reports by en route pilots describing in-flight weather conditions--would be received and encoded into the new standard format by FAA, the National Weather Service, and military personnel and fed into a teletypewriter network for distribution nationwide. The new standard format would make reading and relay of the PIREPS easier for weather briefers and pilots and make the PIREPS themselves more adaptable for use in the new, automated weather communications systems, which made special provision for their rapid sorting and display.

- o Commissioned at the Midland, Texas, Flight Service Station an improved radar-generated weather display

for use by general aviation pilots and FAA flight service weather briefing specialists--the first field facility of its kind in the United States to provide such a service. The display at Midland utilized data from the FAA long-range radar at Andrews, Texas, 60 miles away, to provide a continuous picture of current weather within a 200-mile radius of the radar site. The heart of the system was a data processor that filtered out air traffic returns and optimized weather phenomena on a radar screen displayed in the station. The Midland station was selected for initial installation of the system because of the large amount of general aviation traffic in the West Texas and New Mexico area which it served, its proximity to the Andrews long-range radar, and its location within an area of significant thunderstorm activity. While Midland was the first flight service station in the country to be equipped with the system, it was expected that 43 other strategically located flight service stations across the Nation would eventually provide a similar service.

Communications Improvements

In this area, FAA--

o Commissioned a prototype Terminal Communications Switching System (TCSS) for the Dallas/Fort Worth

TRACON/tower, the newest type of equipment of this sort available. The system made possible a previously unknown degree of flexibility in the communications arrangements needed for the overall monitoring and control of air traffic within a 50-mile radius of the airport. Designed to accommodate future air traffic growth and the projected needs for air traffic control, the system used a single coaxial cable instead of the usual network of paired wires connecting with the controller positions. It eliminated the need for a large telephone branch exchange switchboard center and made it possible for a miniature synthesizer in each controller's position to perform all switching functions and assure immediate access to the cable.

- Planned the early establishment of two National Airspace Data Interchange (NADIN) centers to serve as switching centers for the integrated, digital communications system required in support of domestic and international NAS flight operations. One center was to be co-located with the ARTCC at Salt Lake City; the other, with the one at Atlanta. The system,

which was expected to become operational in 1982, was to replace a number of specialized networks, which, for the most part, could not communicate with one another, had severe growth limitations, and collectively were extremely expensive to operate and maintain.

- Initiated a vigorous research and development program to determine how best to deal with low-level wind shear--a dangerous weather phenomenon characterized by sudden change in the speed or direction of wind encountered by an aircraft on final approach or departure during a small change in altitude. There had been six air carrier accidents since 1974 to which low-level wind shear had been a contributing factor. After identifying the problem as one of the top 10 priority items to which it would have to find a solution, FAA established a special wind shear program office in its Systems Research and Development Service to deal with the problem.

  A data collection project was begun at once in an effort to define the hazard and find solutions to it. A ground-based detection and warning system was installed at Dulles Airport, and the agency arranged for the National Weather Service to undertake a 6-month project for predicting wind shear

conditions at seven major east coast airports in the New York, Philadelphia, and Washington areas during the 1976-1977 winter season. These were the beginning projects. More could be expected as time went on.

- Completed preparations for the commissioning at Kansas City of the automated Area B Message Switching System, a two-computer system that would provide a message switching and storage capability for the agency's 40 circuit Area B teletype system. This system handles the flight plan input for the Nation's IFR air traffic control operations and provides communications service for more than 350 FAA locations across the country. The installation of the two computers in the system would permit the decommissioning of 13 electro mechanical switching systems which had been in use since 1959.

- Put into operation at Steamboat Springs, Colorado, the first of 20 frequency outlets planned for the Rocky Mountain Region. The outlets would greatly improve air/ground communications in the region since they were to be located in areas which otherwise would be without any kind of air/ground coverage.

- Initiated a study at the Remote Center Air/Ground (RCAG) communications facility at Hutchinson, Kansas, to determine the feasibility of remotely monitoring and controlling isolated, unmanned FAA communications facilities. As a result of the study, in which the Hutchinson RCAG was monitored by a computerized central control monitoring system (CCMS) located at the Olathe, Kansas, ARTCC, it was determined that use of the computer made unnecessary the tedious, expensive, and time-consuming task of having technicians pay periodic visits to remote facilities for the performance of routine preventive maintenance. This was because the electronic data displayed by the CCMS gave precise data on their state of repair, thereby obviating the need to send a technician to the site in cases where it was clear routine maintenance was not needed. The implications of the study in terms of improved systems reliability and less costly maintenance were far reaching. As the period closed, the agency was considering the possible implementation of a computerized system resembling the CCMS for the remote control of its unmanned, remote communications facilities.

- Satisfied environmental objections to the location of an RCAG at Aspen, Colorado, by housing

the facility, which adjoined a ski lodge, in a timber, "A" frame structure designed to look like a Swiss alpine chalet. The electronic equipment and the backup engine generator for emergency power were housed in the "chalet" itself. The antennas were mounted on the roof, where they blended with their surroundings, and electric power was furnished by the extension of an existing overhead line adjacent to the site. Access to the RCAG was via an existing ski slope maintenance road in summer and by ski lift in winter. The Rocky Mountain Region, whose installation it was, saw to it that there was a minimum of cutting and trimming of trees and as little grading as possible when the facility was installed, thereby altering the environment so little that the community's accustomed image appeared to be in no way affected.

Inspection from the Air: The Navaid Flight Inspection Activity.

The reporting period was a climactic one for the airway flight inspection activity because, in a development which began in 1968, the modernization of the flight inspection fleet was finally completed. This made it possible for the flight inspection job to be accomplished for the foreseeable future, better, faster, and at much less cost than before. The modernization effort involved years of planning and preparation, but in the end assured the agency an inspection

fleet that was as modern and as well-instrumented as the state-of-the-art would permit, thereby greatly enhancing the effective discharge of the flight inspection function and assuring to an even greater degree than before the safety of air navigation on the Nation's airways.

In 1968, when the modernization effort began, the domestic flight inspection activity had, for the most part, old and obsolete DC-3 aircraft to work with; and with 17 flight inspection field offices (FIFO's) reporting to five separate regional headquarters, the activity was highly decentralized--a state of affairs that reflected the relatively short range and low speed of the old, piston aircraft with which it was equipped. The planes were dependable, but their productivity was low and their operating and maintenance costs were exceedingly high. It was clear that what was called for were modern, faster aircraft which would make it possible to centralize the activity and operate it more efficiently. In an exploratory action on how best to proceed in the matter, the agency replaced 10 of its old DC-3's with five leased Sabreliner jets, instrumented them, and put them to work in its flight inspection fleet.

Using the rented Sabreliners paid off. Within the next few years, thanks to their rental, 133 positions were saved and 4,358 fewer flight hours had to be flown to do the job.

With these figures in hand, FAA drew up a comprehensive plan in 1971 which called for (1) the procurement of modern jets to replace its obsolete piston fleet, and (2) the establishment of a centralized flight inspection organization to manage the program. The plan emphasized that taking these actions would not only afford the agency significant savings but would also permit the closing of all but seven FIFO's, from which modern jets could reach any navaid in the contiguous 48 states in an hour or less. The plan was accompanied by a special study which demonstrated that equipping the fleet with jets would make it possible to do the flight inspection job with 22,000 less flight hours annually, eliminate 301 positions, and save approximately $7.7 million annually.

Congress bought the plan; and in June 1972, just as Fiscal Year 1972 was closing, FAA received congressional approval to replace its 47 old piston aircraft with 20 light jets and a turboprop. A total of $51,650,000 was authorized for the procurement and implementation of the plan began.

The first step was taken in December 1972, with the establishment of a new, centralized flight inspection headquarters, the Flight Inspection National Field Office (FINFO) at Oklahoma City, to replace the five flight inspection headquarters in the regions. Procurement action had

meanwhile been going on apace, and by the following June, contracts were concluded for five Jet Commanders and 15 Sabre-80 jets. FINFO became operational on July 1, 1973; and by the following June had received all five of its Jet Commanders and had begun closing down the 10 surplus FIFO's. During Fy 1975, FINFO reached its programmed organizational configuration of seven FIFO's, signed a contract for a Super King Air Model 20 turboprop, and began receiving the first of its Sabre-80 jets.

The plan was fully implemented by the end of the reporting period. By that time all the Sabre jets had been received and were in operation, the turboprop was due in from the factory and the inspection fleet's DC-3 inventory was down to 10 aircraft, all of them due to be phased out by December 1976.

FAA's long-range flight inspection needs, which could be dealt with only by large aircraft, were also taken care of during the period. There, as in the case of the DC-3's, the agency had been doing the job with aircraft that had been good in their time but were now old and obsolete, difficult to maintain and costly to operate. To replace them, the agency in FY 1973 asked Congress for funds to purchase two large jet aircraft. Congress approved the request, and in FY 1975 authorized $5.6 million for the

purchase of two used aircraft of the required type. In October 1975, FAA signed a contract for the purchase from Air Finance International of two Boeing-727 jets previously owned by Lufthansa. The two B-727's were delivered to Oklahoma City in April 1976 and modified for flight inspection purposes at the aircraft maintenance base there. One of the B-727's, instrumented both for basic flight inspection operations and Semi-Automatic Flight Inspection (SAFI) operations, replaced a Boeing C-135 used for long-range flight inspection in the Caribbean and North Atlantic and two Convair 580's used for long-range SAFI inspections. The other B-727 was assigned to the Pacific where it replaced an old, jet prop Lockheed Electra which had been used for long-range overwater flight inspection missions in that area. A suitably instrumented agency Beechcraft 55 took over the short-range, inter-island responsibility. The B-55 did the job so well that it became possible to assign the new Super King Air turboprop, which had originally been intended for the task, to Hangar 6 in Washington where there was greater need for it.

Other Air Navigation and Air Traffic Control Developments.

In addition to the foregoing, FAA—

- In concert with the air carriers and the air carriers organizations worked out a standard arrival profile for turboject aircraft. Under the system, which was to be put into use first at Stapleton International Airport at Denver, and implemented all over the country by 1978, turbojet aircraft, upon arrival at an airport and while about to land, would be held at their most efficient cruise altitude from which

they would make a safe, easy, idle thrust descent to the ILS glide slope intercept. The system had a number of obvious advantages. Using it would standardize the descent profile, eliminate terminal area saturation by making it possible to meter the arrivals at a volume the airport could handle without the need for excessive speed reduction and low-altitude vectoring. It would also enhance safety over the terminal, save jet fuel, reduce noise pollution by keeping aircraft higher for longer periods, as well as promoting safety and efficiency by reducing the amount of time flown by turbojets at lower altitudes, where they were more wasteful of fuel and where the danger of collision with uncontrolled aircraft was greater.

o Had a joint Air Traffic Service/Flight Standards Service task force prepare a Pilot/Controller Glossary that defined over 600 key words in daily use by pilots and controllers in air traffic control operations to make sure that they shared a common understanding of what those words and phrases meant. The completed glossary was given the widest possible distribution. It was incorporated into the FAA's Air Traffic Control and Flight Standards Service handbooks and included as an appendix to the May 1, 1976,

issue of Part 1 of the Airmen's Information Manual (AIM). The AIM part was given a large printing and all 700,000 of the Nation's certificated pilots were informed in a personal letter from the Administrator that all they had to do was ask for it. At least 350,000 of the 700,000 asked for--and received--the publication.

- Established the Air Traffic Procedures Advisory Committee to review the agency's Air Traffic Control Handbook with a view to enhancing its usefulness to its users and further improving its procedures, clarity and organization. The committee was to be composed of members of the FAA, the Army, the Navy, the Air Force, the Air Transport Association of America, the Professional Air Traffic Association, the Air Traffic Control Association, and a half-dozen other pilot , air carrier , and air transport associations. The review was to take two years to complete, following which the committee would make its recommendations to the Administrator, who would act on them as he saw fit.

- In concert with the U.S. Coast Guard, initiated a program to evaluate the Loran-C air navigation system as a possible supplement to, or replacement for, the

VOR/DME (VORTAC) air navigation system. Joint flight testing operations were to begin in September 1977, and a report evaluating the system was expected to be completed by mid-1978.

- Approved a project to provide aerial tramway access to the Salt Lake City Air Route Surveillance Radar (ARSR). This long-range radar is located on a mountain peak and access to it is via a 12-mile mountain road. The new tramway, which will be approximately 3.22 miles in length and rise to a height of 4,600 feet, will replace the access road, reduce hazardous travel to and from the mountain top, and, in the long run, save the Government a great deal of money. When the tramway is in place and operating, the experience will be evaluated for its possible applicability to other ARSR mountain sites.

- Commissioned an automated National Air Space (NAS) documentation facility at NAFEC. The facility was to use micrographic technology in producing required NAS documents. Distribution of the documents was to be primarily in microfiche form, thereby assuring significant cost savings over previous documentation methods.

- Issued an advisory circular recommending a standard traffic pattern for airports without control tower service. The Circular (AC 90-66) gave a diagram of the rectangular shaped standard left-turn pattern it recommended for all non tower airports. It also provided a diagram for a standard right turn traffic pattern for use at airports where approved lighting systems or markings required it. In addition to dealing with recommended operating practices, altitudes, takeoffs, landings and speeds, the circular advised pilots on the proper angle of entry to the pattern, turning procedures for the different legs, and preferred methods of leaving the pattern.

- Revised its Air Traffic Control staffing standard, an engineered staffing guide which replaced an assortment of guides, formulas and standards in use by the Air Traffic Service in previous years. Following additional measurements and observations by a joint team of Air Traffic Control and staffing standards specialists, the standard, which measured the relationship between man hours expended and work units produced in Air Traffic Control specialties was updated just as the period opened. The result was a printout, which was used at the Washington level to distribute available manpower equitably among the

regions. It was also used to provide guidance to regional authorities in further distributing that manpower among the individual regional air traffic control facilities. As of the close of the period, the standard was in active use in staffing the ARTCC's, ATCT's, and flight service stations in the NAS system.

o Announced a National Beacon Code Allocation Plan, under which pilots flying in the contiguous 48 states would be able to keep one individual radar beacon identification code from takeoff to landing, and not have to bother changing codes as was previously the case when they flew from one area or altitude to another. To work this out FAA took all the individual transponder, radar beacon codes available for air traffic control use, regrouped them, and assigned blocks of codes to all ARTCC's and ARTS III-equipped airports. Under the new system, when a pilot flying under instrument flight rules filed his flight plan with the appropriate FAA air traffic control facility, a computer would process it and assign a four digit radar beacon code to the flight. As the pilot prepared to take off, he would set his transponder to that code, where it would remain for the entire flight.

- Made it mandatory for pilots to get air traffic control clearance before taxiing on taxiways at airports with operating control towers. This clarified a long-standing rule in FAR Part 91, General Operating and Flight Rules, which required clearance for takeoffs and landings and for taxiing on runways, but said nothing about taxiing on taxiways.

- Provided the Air Force with FAA air traffic control specialists to fly on USAF facility check flights to determine the effectiveness of air traffic control service provided to the military at busy terminals where there was a heavy mix of civil and military traffic. In the first mission, flown in an Air Force C-140 Jetstar, the FAA-USAF crew checked the FAA approach control facilities in the Norfolk, Virginia, area. Also to be inspected were military landing fields where USAF controllers provided approach control services to civil aircraft.

- Commissioned a new type of BRITE numerics equipment for use on TV displays in the tower cabs of airports with an intermediate level of traffic. The airports at Fayetteville, North Carolina, and Fresno, California, were the first such airports to get this equipment and began using it early in the period. For the first time, controllers assigned to this class of airport

could read off in BRITE numerics form an aircraft's code identification and its altitude, in addition to its location, which was all that they had had on their screens before. The equipment was expected to be installed at a total of 40 such airports by the end of the period.

- Put into operation at the Dallas/Fort Worth terminal in March 1976, a high arrival/profile descent procedure which called for a metering and spacing effort by the Forth Worth ARTCC and the Dallas/Fort Worth TRACON acting in concert. The ARTCC began metering and spacing inbound jets about 150 miles out from the terminal and the TRACON took over the job about 100 miles later when they began entering its airspace. To make sure that there were no more arrivals at the terminal than the terminal could handle, the controllers assigned speed adjustments to the pilots and, on the basis of projected arrival times as determined by computer, made certain that they arrived at the airport's navigation fix at precisely the right time to begin an idle thrust descent to the approach point for a landing. This procedure made it possible for the jets to operate

at high altitudes longer, enhanced fuel economy and safety. The Southwest Region, which worked out the procedure, estimated that because of it air carriers using Dallas/Fort Worth saved up to two million gallons of jet fuel per year in their landing operations at the terminal.

Chapter 4

THE AIRPORTS FUNCTION

Under the Federal Aviation Act of 1958 (as amended) and a delegation of authority from the Secretary of Transportation, the FAA Administrator is "directed to encourage and foster the development of civil aeronautics and air commerce in the United States and abroad." Acting under the authority of this directive and appropriate implementing legislation, the agency involves itself in the development on a continuing basis of the National Airport System Plan (NASP), a nationwide system of state and locally owned airports, capable of meeting the Nation's ever-expanding civil aviation needs. Responsibility for promoting and assisting in the development of the system is in FAA's Office of Airport Planning and Programming (APP); and the basic legislation governing its funding is the Airport and Airway Development Act of 1970. Amended in 1971 and 1973, the Act was again amended in 1976 toward the close of the reporting period. This important development and other significant airport developments of the period are discussed in what follows.

REVISING THE GRANTS PROGRAM: THE NEW GUIDELINES

The 1970 Act: The First 5 Years

The Federal Government has funded airport development projects through grants-in-aid to state and local airport sponsors since the passage of the Federal Airports Act of 1946, which established the Federal Aid Airport Program (FAAP). By the late 1960's, the program which drew its money from the General Treasury Fund, was seen to be inadequate for the Nation's airports needs. It was repealed in May 1970 by Public Law 91-258--a two title law which was to run for 10 years, and of which Title I was the Airport and Airway Development Act, and Title II, the Airport and Airway Revenue Act. The rationale behind the 1970 law was the establishment of a user tax/trust fund to take care of airport and airway revenue raising and funding. User taxes on passenger fares, aviation gasoline, jet fuel, air freight waybills, etc., would be levied, and an Airport and Airway Trust Fund established under Title II. The proceeds of the Trust Fund, together with such other funds as Congress might wish to appropriate, would be used to defray costs under Title I, the airport and airway development portion of the law.

Two grant-in-aid programs were provided for under the 10-year 1970 Airport and Airway Development Act: The Planning Grant Program (PGP) and an Airport Development Aid Program (ADAP).

The grants programs were fund matching programs under which the Federal Government paid a predetermined share of approved airport planning and development projects, and public airport sponsors at the various state and local levels, who were eligible to participate in the program, paid the rest.

Carefully drawn and responsive to the earlier FAAP experience with airports grants-in-aid, the 1970 act provided that the funding authority of the grant-in-aid programs would expire on June 30, 1975, which is to say, at the end of the act's first 5 years of operation. The object was to see what changes needed to be made in it before further funds were authorized for the Airport and Airway Development Act's next five years.

During those first 5 years, the Federal share for approved Planning Grant Program (PGP) projects had been 66 2/3 percent, and PGP funds had been obligated at the rate of approximately $8.0 million annually, or $40.0 million for the 5-year period. The act had given FAA authority to obligate up to $15 million per year in any given year, provided that total PGP funds obligated during the full 10-year period did not exceed $75 million.

A total of 1,059 planning grants were approved during the 5-year period--949 for airport master plans, and 109 for airport system plans. Of the 949 master plans, 281 had been

for air carrier airports, 623 for general aviation airports, and 45 for reliever airports--that is to say, airports located near busy air carrier airports for the express purpose of siphoning off general aviation traffic that otherwise would have no choice but to use the air carrier airports. The 109 airport system plans had made possible the completion of plans at state, regional, and metropolitan area levels for comprehensive area-wide airport systems tailored to the need of air traffic at those levels.

ADAP funding under the act--for which the Federal share for large- and medium-air carrier hubs had been 50 percent, and for the smaller air carrier, general aviation and reliever airports, 75 percent--had initially been $280 million per year; and in 1973, under the amendments to the act of that year, had reached an annual level of $310 million. Total ADAP funds obligated under the act over the 5-year period totalled $1.3 billion--a figure that exceeded by $100 million the $1.2 billion airport development aid funds obligated by the Federal Government in the entire 24-year history (1946-1970) of the earlier Federal Aid Airport Program.

This $1.3 billion had made it possible for FAA to approve and fund a total of 2,434 ADAP projects during the 5-year period.

Of this number, 1,528 had been completed at air carrier locations, 757 at general aviation airport locations, and 149 at reliever airport locations. The beneficiaries included 520 air carrier airports, 624 general aviation airports and 81 reliever airports. For the air carrier airports, the Federal funds expended came to $1.09 billion; for general aviation airports, to $212.8 million; and for reliever airports, to $61.6 million.

With this massive infusion of Federal money, 85 new airports were built, and more than 1,000 others significantly improved. The improvements included 178 new runways, 520 new taxiways, 201 runway extensions, hundreds of miles of security fencing and whole fleets of crash, fire fighting and rescue (CFR) vehicles. They also included some of the most advanced technical equipment available, including 28 instrument landing systems (ILS), 31 approach lighting systems (ALS), 141 runway end identifying lighting systems (REILS) and 477 visual approach slope indicators (VASI's).

A basic feature of the act, and one that had been notably helpful in implementing it during the 5-year period, had been the preparation and publication of a 10-year National Airport System Plan (NASP) to provide data from which to anticipate and take care of the Nation's future airport needs. A first

edition of the NASP had been published in September 1973 in 11 regional volumes and a narrative summary, and had been kept current since by computer printouts available at FAA regional offices. The plan envisioned a total of 4,000 airports in the system at the end of the 10-year period, with a total estimated development cost (in 1972 dollars) of $6 1/2 billion.

It was a well-conceived, well-drawn act which had served the Nation well in the few years that it had been in operation. Nevertheless, as its obligational authority began drawing to a close, it was already clear that the required review was fortunate in its timing; and that with a sharp increase in air carrier and general aviation operations, mounting environmental and landside access problems, and a raging inflation, there was no time to be lost in getting it underway.

The Grant Program Lapses

At the DOT budget review in November 1974 representatives of OMB requested FAA to submit its recommendations for an up-dated grant program as quickly as possible so that they could be included in the President's FY 1976 budget. This presented no great problem. FAA had been

working on the program for some time, and its recommendations were ready and on their way to DOT within a week.

FAA's recommendations had no sooner reached the Secretary's office when the review was broadened to include revision of the entire act and not just changes in the grants program as OMB had initially requested. The Department sent the revised and expanded draft to OMB; and OMB, after reworking it and sending it to the President, who added his guidance, returned it to the Department. The draft then went back to the FAA, which worked on it still further to reflect the President's wishes.

The bill, into which so much work had gone, began with declaration of policy, which held it to be essential that greater responsibility be put on the states and airport owners for improving the Nation's civil airports. This meant, it continued, that the states would have to "assume full responsibility for financing general aviation and development by June 30, 1978,"--in short, without further help from the Federal Government. In line with this preamble, the bill made two related proposals: the delegation to the states of the general aviation airport grant management function within the 3-year period; and the termination at the end of that time of all Federal support of the function, following which

it would revert to the states which would finance it thereafter from their own resources.

To help the states in the discharge of this responsibility, the bill proposed that--subject to restrictions as to the amount, method of collection and use--the states, or their local subdivisions, be allowed to impose their own charges on passenger enplanements. Another proposal was to increase the Federal fuel tax applicable to general aviation from 7 cents to 15 cents a gallon for the 3-year period FY 1976 through FY 1978; and beginning in FY 1979, when Federal grants for general aviation airport development would terminate, to reduce it to 10 cents per gallon, thereby leaving the states latitude to impose their own tax for the difference, if they so desired. On the funding side, the bill proposed an annual ADAP funding level for the air carrier/reliever airports category of $300 million for the 5-year period--a figure that was to include not only airport master planning (a PGP component which would now be carried as part of ADAP), but a discretionary fund as well. This was an increase of $10 million per year over the then existing $290 million ADAP level allotted to these airport categories. For the general aviation airport

category, the proposed funding level was to be $50 million annually, but for 3 years only--an average increase of $15 million per year over the existing $35 million level for those 3 years.

New requirements proposed in the bill included the following: that the Federal share of all matching grants be increased to 75 percent; that the public use portions of terminal areas of airports serving the certificated air carriers become eligible for ADAP funding; and that the acquisition of land for environmental compatibility and noise abatement purposes also become available for ADAP funding. The bill also proposed that the National Airport System Plan (NASP) be deleted, and that there be substituted in its place a periodic report by the Secretary setting forth how things were going with the system, and what was planned for it in the future. The bill proposed further that air carrier ADAP grants be apportioned directly to the owners without prior FAA project-by-project review; and that multi-year ADAP grants be made to facilitate more effective planning at state and local levels.

The bill also proposed the replacement of the existing passenger enplanement formula by a new formula based on

airline aircraft departures. A further provision had to do with the Airport and Airway Trust Fund. Here the recommendation was that the fund, which was already being used for the acquisition, installation and improvement of airway facilities, also be used for direct costs and administrative expenses incident to the maintenance of airway facilities, thereby relieving the Treasury of having to pay for them out of the General Fund.

The Department's proposed legislative package, the "Airport and Airway Development Act of 1975" was introduced in the House on March 17, 1975, as H.R. 5017, and in the Senate on April 17, 1975, as S. 1455. A special message to Congress from President Ford asking for its speedy enactment accompanied the House package.

The President's message was persuasive and received close attention. But the House, which had been working on the problem for some time, already had its own ideas on what to do. On March 17, 1975, the very day that the Administration bill reached the House, its Aviation Subcommittee opened hearings on two bills of its own on the same subject, prepared within the Subcommittee itself.

One of the bills (H.R. 4312) had been introduced 12 days earlier by Congressman Dale Milford of Texas, for himself and 8 other members of the Subcommittee. Leaving PGP, NASP, and other structural features of the act untouched, the bill provided for an extension of the grant-in-aid programs for the remaining 5 years of the act and called for an expansion of the types of projects eligible for ADAP funding to include funding for environmental compatibility and the improvement of air carrier terminal facilities. It also proposed an overall funding level of $515 million per year, to include $425 million per year for the air carrier/reliever airports category; $75 million per year for the general aviation airport category; and $15 million per year for planning grants.

The other bill (H.R. 4380) had been introduced on March 13, 1975, by the Chairman of the Aviation Subcommittee, Congressman Glenn M. Anderson of California. Anderson's bill was drawn along similar lines to Milford's, but had some added features. It proposed use of the Trust Fund for airway facility ma[illegible]ance, the assumption by the Federal Government of a larger share of project development costs, and an expansion of the list of projects eligible for ADAP funding, including the purchase of land, and the improvement of air carrier airport terminal area facilities. It called for the preparation of a series of airport planning studies, and proposed a grant-in-aid funding level of $570 million per year for the 5-year period,

of which $495 million would be for air carrier/reliever airports and $75 million for general aviation airports. In addition it authorized a maximum of $10 million from the Secretary's discretionary fund for planning grants for use throughout the system.

Hearings in the House began on March 17, and continued until May 15. A total of 19 witnesses representing user groups, the Congress, local governments and the Administration, appeared before the Subcommittee and gave their views on the problems at hand.

Opposition to the Administration's proposal centered on the following provisions: (1) the funding level, which was considerably lower than that proposed in H.R. 4312 or H.R. 4830; (2) turning over to the state grant management responsibility for general aviation airports without providing funds to administer the function; (3) the passenger enplanements tax proposal; (4) the increase in general aviation fuel tax rates to help states fund general aviation airport development, (5) deletion of the NASP and PGP; and (6) direct grants to air carrier airports instead of project-by-project approval.

With the 1970 Act due to expire on June 30, Senate Aviation Subcommittee Chairman Howard Cannon moved to head off a lapse

in the funding authority. On June 18, along with ranking minority member James Pearson, he introduced S. 1972 which provided for a 90-day extension. The bill passed the Senate on June 24, but remained at the Speaker's table in the House until September 8. In the meantime, on June 24, Congressman Milford introduced a similar measure in the House. It was referred to the Public Works and Transportation Committee but no action on it was taken.

There was now no way to avoid the lapse. June 30 came and went with the House Subcommittee still at work on the bill. A few days before, Congress had made $2.8 million available to the agency for the funding of existing planning grant projects for which unspent surplus funds were available. But, other than that, the flow of grant-in-aid funds had been turned off.

Amending the Act: Congress Finishes the Job

The Subcommittee continued working on the bill, and finally, in the latter part of September had the bill it wanted. On September 22, 1975, Public Works Committee Chairman Robert E. Jones of Alabama introduced H.R. 9771, the Subcommittee's bill.

The bill had echoes in it of the hearings and of virtually all the bills the Subcommittee had considered. It was most

comprehensive, and clearly reflected the more than 6 months of work the Subcommittee had put into it.

The bill retained most of the basics of the 1970 Act. Its key points were:

- Retention of the PGP-ADAP funding structure for the second 5 years of the Act.

- A funding program with an initial level of $450 million for air carrier and general aviation airport development which would grow incrementally year-by-year for the rest of the 5-year period until it reached a level of $550 million in FY 1980.

- Retention of the requirement that air carrier ADAP grant projects be scrutinized and approved by FAA prior to the apportionment of funds for those projects.

- Continued use of the Trust Fund for the acquisition, establishment, and improvement of Federal airway facilities, and use of the Fund for the flight inspection and maintenance of those facilities.

- Retention and continued use of the NASP and the funding of related planning studies to increase its usefulness still further.

- o Increase in the Federal share of project costs.

- o Expansion of ADAP funding for the purchase of land for noise abatement purposes, and the improvement of the public use portions of airport terminal areas to enhance landside access to the air carriers.

- o Use of a revised passenger employment formula for the computation of air carrier airport ADAP apportionments, rather than the aircraft departure formula proposed by the Administration.

- o Establishment of an 11-state demonstration program to determine the feasibility of state administration of the general aviation airport portion of the grant program.

- o Creation of a new commuter service airport category within the air carrier airport classification with full provision for its funding.

The Committee reported the bill out on October 29, 1975. On December 18, 1975, it passed the House by a vote of 368 to 16, and the next day was referred to the Senate Commerce Committee for action.

The Senate meanwhile had been working on a bill of its own. Holding hearings in September, the Senate Aviation Subcommittee

headed by Senator Cannon was no more moved by the Administration's bill than the House Subcommittee had been. Accepting provisions in it with which it agreed and discarding the rest, it went on with the preparation of its own bill.

The Subcommittee held mark-up sessions in November and December but did not immediately put a bill together. However, a bill was ready early in the New Year. Reported to the Commerce Committee on February 24, 1976, it was put on the Senate calendar on March 24, 1976, and passed the next day, March 25, 1976, by a vote of 73 to 3.

The Senate bill S. 3015, had some strong similarities to H.R. 9771. It retained the act's basic PGP-ADAP funding structure and its NASP planning mechanism; continued the requirement for prior review by FAA of air carrier airport ADAP projects; and included virtually the same passenger enplanement formula for the computation of air carrier ADAP grant apportionments.

Like the House bill, it allowed the use of ADAP funds for the purchase of land for noise abatement purposes, and for air carrier airport terminal area improvements to facilitate landside access for passengers and their luggage. It also provided for the establishment of a commuter service air carrier airport category, and the funding of the various studies proposed by the House for use in national airport system planning.

It differed markedly from the House bill, however, in a number of other respects. For instance, it called for a much higher funding level than the House bill did. The Senate proposed a figure of $540 million for FY 1976, increasing each fiscal year to a level of $700 million for FY 1980. This was $607.5 million more than the House version for the 5-year period, not quite twice the amount the Administration had proposed. The bill authorized a demonstration program to establish the feasibility of state administration of the general aviation portion of the grant program, but limited participation to no more than three states. The House bill authorized funds from the Trust Fund for the revision of the NASP, but the Senate had no comparable requirement. Also, there was no provision in the Senate bill authorizing the Secretary to make grants to states for the development of state standards for general aviation airport development. The bills also differed markedly on the percentages for the Federal share of ADAP grants.

These were substantial differences that could be resolved only by conference, which the House asked for on April 6. On April 13, the Senate agreed and named its conferees. The conference--with Senator Cannon serving as Chairman, and Congressman Anderson as the ranking manager for the House--took 4 days (May 12, 13, 18, and June 2) to reach an accommodation on the bill.

As was to be expected, there were concessions on both sides. The problem of development grant levels was taken care of when the conferees agreed to adopt substitute funding levels. The initial level, set at $500 million for air carrier and general aviation airports was to increase to $610 million by FY 1980. In the matter of airway maintenance, the conferees agreed to a provision which authorized appropriations for direct costs incurred to flight check and maintain air navigation facilities. Another issue in contention--funding for terminal development--was resolved when the conference agreed to a provision which limited the Federal share to 50 percent of project costs and specifically included multimodal terminal development as an allowable development project for carrier airports. In addition, it was agreed that four states should participate in the general aviation airport demonstration program instead of the three proposed in the Senate bill, and the 11 proposed by the House.

On June 2, 1976, the work of the conference was finished. A report was filed in both Houses on June 23 and the Senate agreed to its adoption the same day. The House followed on June 30. The compromise bill, which the President signed into law on July 12, 1976, as P.L. 94-353, went into effect immediately as the Airport and Airway Development Act Amendments of 1976. The job of revising the grant program

and otherwise amending the 1970 Act had finally been completed, a good year-and-a-half after it had been undertaken.

The Amendments of 1976

Reduced to their essentials, the Amendments of 1976--

- Sharply increased ADAP funding levels for the 5-year period the 1970 Act still had to run. The total 5-year ADAP funding level, including ADAP funding for air carrier airport and general aviation airport development programs was set at $2.73 billion, to be obligated in annual increments of $500 million, $510 million, $540 million, $575 million, and $610 million. The ADAP air carrier airport funding level, totaling $2.36 billion for the 5-year period, was to be obligated in annual increments of $435 million, $440 million, $465 million, $495 million, and $525 million. The general aviation airport funding level of $375 million for the 5-year period was in turn to be obligated in annual increments of $65 million, $70 million, $75 million, $80 million, and $85 million.

- Authorized a PGP funding level of $15 million per year. In addition, a limit set in the 1970 Act, under which no more than 7 1/2 percent of the planned funds made available in any one year could be granted to sponsors within any one state, was raised to

10 percent to allow more flexibility in the issuance of the grants.

- o Sanctioned the grant of funds to states to develop standards for airport development at general aviation airports, other than standards for the safety of approaches.

- o Simplified funding procedures. This was accomplished by: (1) directing that two-thirds of the available air carrier airport ADAP funds go into a separate apportionment fund, and the remaining third into a discretionary fund, thereby making it easier to accommodate long-term funding requirements as well as emergency situations; (2) permitting sponsors to secure approval for the use of future-year ADAP apportionments for projects requiring several years to complete, thereby facilitating planning for the development of their airports on a long-term basis; and (3) providing for guaranteed minimum funding levels at the rate of $50,000 per year for air carrier airports served by small air carrier aircraft; and $150,000 per year for air carrier airports served by aircraft heavier than 12,500 pounds. The act

specifically established minimum funding levels for air carrier airports to ensure that development funds would be available to the smaller lower activity airports.

- Expanded the types of airport development projects eligible for ADAP funding. These would now include the following: (1) snow removal equipment; (2) noise suppressing equipment; (3) physical barriers and landscaping to diminish the effects of aircraft noise; and, (4) the acquisition of land to ensure environmental compatibility. Non-revenue, public use terminal area facilities for the movement of passengers and baggage at airports serving CAB certificated air carriers would also be eligible for ADAP funding, except that in such cases the Federal share would be 50 percent.

- Established the "Commuter Service Airport"--a new air carrier airport category comprising about 130 airports that served non-certificated air carriers, and enplaned at least 2,500 passengers annually. This new airport category was created in recognition of the substantial growth of commercial commuter services during the previous 5-year period, their potential for future

growth, and the resulting need to assure airports serving them proper development funding. The amendments provided that airports in this category would be eligible to share in a $15 million annual fund specially set aside for them off the top of the ADAP air carrier discretionary fund, and would also be eligible for any available air carrier discretionary funds.

- o Directed that the reliever airports in the National Airport System, previously grouped for funding purposes with the air carrier airports, be included instead with the general aviation airports category since, aside from their usefulness as relievers, they were basically general aviation airports. As such, they would be eligible to share in a $15 million annual fund set aside for their use from the top of the total general aviation airport ADAP fund, and would be eligible as well for ADAP funding from the general aviation airport discretionary fund.

- o Increased the Federal share for ADAP grants. For small air carrier hubs, general aviation airports, reliever airports and commuter service airports, the Federal share would be 90 percent for FY 1976

through FY 1978, and 80 percent for FY 1979 through 1980. For the 67 large and medium hubs in the National Airport System, it would go from the previous 50 percent to 75 percent and remain there throughout the entire 5-year period.

- Increased the Federal share for PGP grants from 66 2/3 percent to 75 percent, except that the share for airport master planning grants would be the same as the share for airport development grants which they were supporting; and which, depending on the case, could go as high as 93 percent for the smaller airports in public land states. For system planning grants, the Federal share would be 75 percent throughout.

- Established a revised passenger enplanement formula for the apportionment of funds for air carrier airports, other than commuter service airports. Funds for all air carrier airports would be apportioned as follows: \$6 for each of the first 50,000 passengers enplaned at a given airport; \$4 for each of the next 50,000 passengers enplaned; \$2 each for the next 400,000 passengers enplaned; and \$0.50 for each enplaned passenger above 500,000.

- Authorized a four-state demonstration program to test the ability of the states to administer the general aviation airports portion of the ADAP grant program. The demonstration was limited to states that in the estimation of the Secretary were capable of and interested in doing the job. The object was to use them as a pilot group to determine from their performance whether the states as a whole could be expected to do the job more efficiently than the Federal Government was already doing it. The program was to be initiated by January 1, 1977, and to continue for the next 21 months. The results were to be reported to Congress by March 31, 1978, for its use in determining how future state programs in this area could best be organized and managed.

- Ordered the preparation and publication by January 1, 1978, of a major revision of the National Airport System Plan (NASP). Last submitted to Congress in 1973, and kept updated since, the NASP comprised over 4,000 locations, including 649 served by the certificated air carriers. The act made clear that what was sought in the revised NASP was a more selective list that would limit entry criteria to

airports at which it could be reasonably expected there would be need for Federally-assisted airport development in the next decade.

- Gave the FAA Administrator authority to exempt small hub and non-hub air carrier airports enplaning less than 500,000 passengers annually, from the crash, fire, and rescue requirements for airport certification, if he found such requirements to be unreasonably costly, burdensome, or impractical.

- Directed the conduct of a series of studies required in National Airport System planning having to do with the following: (1) the feasibility of land-banking as an expedient in airport development; (2) the case for soundproofing public institutions located near airports; (3) the identification of places in the United States where major new airports would be needed, and alternative approaches to their financing; and (4) the identification of needed airports across the Nation, which for economic reasons were threatened with closure, with an analysis in the individual case of what could best be done to keep them open. The results of the first three

studies were to be reported to Congress by July 12, 1977; the results of the fourth study, by January 1, 1978.

- Authorized the appropriation from the Airport and Airway Trust Fund for the 5-year period FY 1976 through FY 1980 for obligation in annual increments as follows: (1) up to $1.15 billion to cover the costs of flight checking and maintaining the air navigation facilities of the Federal airway system; (2) $1.275 million to assist the states in developing their own general aviation airport standards; and (3) $1.3 billion for the purpose of acquiring, establishing, and improving Federal air navigation facilities.

These, then, were the main provisions of P.L. 94-353, as it further amended the Airport and Airway Development Act of 1970. They would determine how well the continuing needs of the National Airport System were met during the remaining period the act still had to run.

IMPLEMENTING THE AMENDMENTS

Beating the Clock

When the President signed the Airport and Airway Development Act Amendments of 1976 into law on July 12, 1976, Fiscal Year 1976 had come and gone, and it was almost two weeks into the Transitional Quarter. After a full year in which there had been no grant money of any kind available under the act, except for the $2.8 million planning grant money made available by continuing resolution in late July 1975, there were now ample funds on hand ready to be apportioned and disbursed. But with the end of the Transitional Quarter only 10 weeks away, the agency's Office of Airports Programs (AAP)--the FAA organization in charge of national airport system planning and development--did not have much time left in which to do the job.

While AAP and its field units (regional Airports Divisions and Airport District Offices) could perhaps have done more had there been more time, virtually all the priority requirements prescribed in the Amendments were taken care of by September 30. Nor was time lost in making sure that the deadlines for the special studies and the four-state demonstration program would be met. The responsibility was parcelled out between AAP, and two other headquarters offices--the Office of Aviation System Plans (ASP), and the Office of Environmental Quality (AEQ). AAP undertook the airports

closure study; ASP, the landbanking study and the major new airports study; AEQ, the soundproofing study. AAP and ASP were to work together on the four-state demonstration program. ASP was to kick off the program first with the Secretary's announcement, and AAP was to carry the ball thereafter.

Meanwhile, implementation of the new ADAP, PGP, and NASP requirements went on apace and, as will be seen in what follows, was accomplished with remarkable dispatch.

The ADAP Apportionments and Disbursements

FAA was successful in preparing and clearing the FY 1976 and transitional quarter notice of apportionment by July 26, 1976, just two weeks after P.L. 94-353 became a law. It was approved by OST in early August; and on August 10 the apportionment was announced as follows: Of the $435 million ADAP funds authorized for the air carrier airport category, $290 million was for apportionment to airports regularly served by air carriers certificated by CAB; $18.75 million was for commuter service airports; and $126.25 million was for allocation to airport sponsors at the discretion of the Secretary. Of the $65 million authorized for general aviation airports, $34.6 million was apportioned to the states on the

basis of population and area; $462,500 was earmarked for airports in American Samoa, Guam, Puerto Rico, the Trust Territory of the Pacific Islands and the Virgin Islands; $18.75 million was for the 156 reliever airports; and $11.1 million was to be allocated as needed at the Secretary's discretion.

ADAP obligations completed by September 30, 1976, totalled $416.3 million. Of this amount, $411.7 million was for 525 new grant agreements, and the remaining $4.6 million was for an up to 10-percent increase in existing ADAP grant agreements. The agreements provided approximately $351 million for 335 projects at air carrier airports. They also provided $60.7 million for 190 projects at general aviation airports including 29 projects at reliever airports.

Projects funded continued to be selected on a priority basis; and with a heavy accumulation of ADAP requests at hand, the period closed with many ADAP requests unsatisfied. Total requests outstanding at the end of the period numbered 587, with a dollar value of $576.2 million--substantially more than the total ADAP obligation for the period.

PGP Funding

PGP funding for the 15-month period was in two phases. The first phase came about as a result of the $2.8 million that Congress made available to the program just before the

lapse of the grant-in-aid programs on June 30, 1975. AAP used this $2.8 million, the only grant money of any kind available during the fiscal year, to fund 71 planning grants in 24 states with a total dollar value of $2,483,555.

With new planning grant money again available in July 1976, Congress appropriated $15 million in PGP funds the following month for use during FY 1977 and the Transitional Quarter. Because it was not possible to complete the planning apportionment until the middle of September, AAP had only 14 working days within which to issue the grants, and was able to issue 47 before the quarter ended. This brought total PGP grants for the 15-month period to $5,828,607, and made clear that with large increases in ADAP funding projected for the future, new PGP funding records could be expected to be set in FY 1977.

The NASP Activity

The 1976 Amendments directed that a revised National Airport System Plan was to be prepared and published not later than January 1, 1978. The Amendments also laid down the further requirement that more selective criteria than before were to be used to ensure that the justification for the individual airports included in the NASP was beyond question.

The revised plan which was to be prepared after consultation with the CAB and numerous other Federal agencies, as well as with each state and airport sponsor concerned, was to identify the level of public service each airport therein was capable of providing; and was to project over a 10-year period the developments needed to assure the provision of the required level of service. Estimates of the costs of these developments were to be included in the projection and were to be sufficiently accurate to be used in future year apportionments.

Working out a plan under these requirements was a formidable undertaking; and FAA began preparations for revision of the plan shortly after P.L. 94-353 was signed into law in July. By the end of the Transitional Quarter, a data input form had been designed and a study begun of the computer requirements that the preparation of the revised plan would require. A procedure for handling the inputs was also being looked at, and would be developed in early FY 1977.

ENVIRONMENTAL ACTIONS

The expansion under the Amendments of 1976 of the types of airport development projects eligible for ADAP funding to include noise suppressing equipment, landscaping, the erection of noise-absorbing physical barriers and the purchase of adjacent land for noise abatement purposes, was a giant step forward in helping the Nation's airports to achieve environmental compatibility with their surroundings, and in assuring good relations with nearby communities. The favorable impact of these provisions would be felt increasingly as time went on, and would add to the effect of other ongoing environmental actions addressed to the same object. In actions of this sort during the 15-month period, FAA--

- o Approved 16 environmental impact statements (EIS), and made 658 negative declarations in as many airport development actions.

- o Gave environmental review and approval to the extensive developments proposed for the improvement of the Harry S. Truman Airport at St. Thomas, the Virgin Islands.

- o Put strong emphasis on the improvement of the requirements and procedures for the environmental assessment of proposed ADAP airport actions. Following the issue

of a Notice of Proposed Rule Making (NPRM) on the matter in August 1975, FAA Order 5050.2B, Instructions for Processing Airport Development Actions Affecting the Environment, was issued late in the period. The order revised the applicable criteria for the approval of airport layout plans; refined the list of projects requiring environmental analysis; and modified and streamlined environmental guidance in processing terminal area development requests as provided for under the Amendments of 1976. It was a carefully drawn and comprehensive order; and the Secretary of Transportation put the matter well when he identified it in a report to Congress as the mechanism best fitted to secure improvements in the environmental reviews required for ADAP project approvals.

o Contracted for the preparation of a definitive manual to provide guidance in making environmental assessments for ADAP development projects. When ready, the manual was to be used as a text in the Environmental Planning Course being given at the FAA Academy, and was also to be made available for public use.

- Lent its full support to the Sea-Tac Communities Plan involving Seattle-Tacoma International Airport and the communities surrounding it. This was the first major effort of its kind in the Nation to combine in one comprehensive plan the coordinated planning required to achieve environmental compatibility between a large airport and its neighbors. Accomplished during the period under the agency's Planning Grant Program (PGP) at a cost of $642,000, the project was co-sponsored by the Port of Seattle, owner and operator of the airport, and by King County, the local government unit to which the surrounding communities belonged. The plan covered a 20-year period and carried an over-all price tag of $180 million. The recommendations were the outgrowth of a series of studies having to do, among other things, with public attitudes, land acquisition and zoning, solid waste disposal, water quality and drainage, and air quality and noise exposure. Implementing the plan would enable the airport to remain an effective area hub for the full 20 years planned for and beyond, while, at the same time, permitting the full development of the communities surrounding it with no adverse impact from the airport.

CITIZEN PARTICIPATION IN AIRPORT PLANNING

Because the agency feels strongly that public involvement is essential to sound airport planning and that airport operators, sponsors, and planners have an obligation to make sure that their airport plans do not do violence to the needs and desires of nearby communities, FAA prepared a special advisory circular during the period specifically calling for such an involvement. Issued in September 1975, FAA Advisory Circular 150/5050-4, Citizen Participation in Airport Planning, called for early citizen participation in the planning process, whether individually, in citizen advisory groups, workshops, or other similar bodies with a community point of view to express. The circular emphasized the value of such participation, particularly in environmental compatibility, site selection, and other similar issues in which citizens with a direct interest in the matter had a right to be heard.

Though Advisory Circular 150/5050-4 had been prepared without reference to the Sea-Tac Communities Plan, the Sea-Tac experience illustrated perfectly what FAA had had in mind when the circular was in preparation. In Sea-Tac, the planners had worked closely with the citizens and officials on King County, and with their help had prepared the basic studies upon which

the final recommendations had been based. What the circular in effect was asking for was more citizen participation in airport planning in the Sea-Tac tradition.

Chapter 5

INTERNATIONAL AVIATION

Under the Federal Aviation Act (as amended), the FAA Administrator is directed to "encourage and foster the development of civil aeronautics and air commerce," both at home and abroad. This injunction vests the agency with international civil aviation responsibilities, and causes it to work for a global environment in which international civil aviation and U.S. international civil aviation interests can flourish in a symbiosis of benefit to both. For this reason, FAA takes an active role in the activities of international aviation organizations, provides foreign countries in need of them with training and technical assistance; and takes a variety of other actions whose object is to further U.S. international civil aviation interests.

Day-to-Day Activities

The Rulemaking Function

American civil aircraft designed to U.S. standards and manufactured under FAA inspection and quality control procedures have for decades had a wide sale throughout the world. As a result, the agency's standards for aircraft, aircraft engines, airmen, air traffic control, avionics,

navigation aids and maintenance inspection are widely followed elsewhere in the world, and FAA in consequence exercises de facto a role of global leadership in regulatory matters.

The agency does not take this role lightly. It is always ready to respond to all requests for technical advice and regulatory interpretation put to it by foreign aviation authorities. Not only that, but its established policy has been to encourage foreign participation in its rulemaking processes, particularly in the promulgation of rules affecting foreign operators of American-manufactured aircraft. This has been particularly true of recent agency rulemaking activities as exemplified by the Regulatory Review Program begun in 1974 to keep the FAR's in step with technological change--an activity which, it will be recalled, now includes a Biennial Airworthiness Review Program, a Biennial Operations Review Program, and individual review programs embracing as little as a single FAR at a time.

It was also true during the period in the hearings which preceded the adoption of an amendment to FAR Part 129, requiring foreign air carriers entering the U.S. to implement security screening procedures similar to those already

applicable to the U.S. carriers. This was a far-reaching development which directly affected 68 foreign air carriers, flying 11.6 million passengers into and out of the United States annually. Care was taken, therefore, to give the foreign carriers every opportunity to comment on the proposal both orally and in writing, and to see to it that their views were given every consideration before the amendment was adopted.

Backing the Export Effort

It is an international fact of life that the airline fleets of the world are made up predominantly of U.S. manufactured aircraft, and that nine-tenths of the general aviation aircraft operating in the world are also of U.S. manufacture. A prime reason for this happy state of affairs is the FAA aircraft certification system with its attendant inspection and quality control procedures during the manufacturing process, and its airworthiness directive (AD) backup afterwards. The system insures that U.S. manufactured aircraft, whether sold domestically or shipped abroad, are safe, airworthy, and as advanced technologically as the state-of-the-art will permit. The result is a superior product which sells well abroad and accounts for the wide lead the U.S. enjoys in overseas export sales.

Currently, the U.S. in addition to manufacturing 84 percent of the world's jet air transport aircraft and 90 percent of its general aviation aircraft, exports 73 percent of its carrier production and 30 percent of its general aviation production. Its export sales of civil aircraft, engines, avionics and parts in 1976 totalled $5.68 billion, one of the largest export items in the Nation's international balance of payments for the year.

FAA is also of help to industry in the export of U.S. manufactured air traffic control systems, including navaid, communications and airway facility equipment. Agency policy here is to provide assistance to foreign governments in their efforts to establish safe and effective air traffic control systems, while at the same time, assisting U.S. manufacturers of this type of equipment to establish themselves in international markets. The problem is to bring the customer and the manufacturer together without becoming involved in the actual sale of the equipment--and this the agency has no trouble doing.

As the largest operator in the world of air traffic control, navaid, communications and airway facility equipment, FAA is continually being approached by foreign governments with requests for assistance in setting up air traffic control systems appropriate for specific airports in their

countries which they propose improving. Since the agency has available to it in the United States every size of terminal area and can use the various terminals for comparison, it is in a position to demonstrate to foreign aeronautical authorities, functioning terminal areas of exactly the size and capacity the foreign government has in mind.

To give a few examples: Lawton, Oklahoma, Anchorage, Alaska, and Louisville, Kentucky, with 64,498, 110, 005, and 114,600 operations respectively in 1974--the last year for which figures are available--almost duplicate the 65,478, 109,000 and 116,400 operations at Caracas, Singapore and Teheran, during the same period. That these U.S. airports almost exactly duplicate the number of operations at these foreign airports is obviously of help to the agency in dealing in such matters with officials from Venezuela, Singapore and Iran. It makes it easy for the agency to show them an American terminal in full operations of exactly the right size for their needs, using precisely the kind of equipment they should be looking for.

In such circumstances, FAA is happy to assist the aeronautical authorities of interested foreign governments to come to the U.S. to see in operation the terminal or terminals closest to those they have in mind, and wish to improve. It will arange to have them talk to the engineer

who developed the equipment; the FAA logistical experts who handled the procurement; and the people in the field who operate and maintain it. What is more, the agency will, at their request, put them in touch with the manufacturer of the equipment or--if there are several in the field--with other manufacturers of the same type of equipment.

Since it cannot be quantified, there is no way to say precisely to what extent FAA's good offices result in foreign sales of this type of equipment. The fact remains, however, that substantial sales do result; and that they take place as often as they do, is an indication of the good relations enjoyed by FAA in its dealings with civil aviation authorities elsewhere in the world.

The Reception of Foreign VIP's

Another way in which the national interest is served internationally, occurs when FAA personnel at headquarters--as they do constantly--serve as hosts to their opposite numbers in civil aviation organizations from all over the world when the latter visit the U.S. to familiarize themselves with the way FAA does things, and to learn what its plans for the future are. FAA takes these visits very seriously. It sees to it that the visitors are properly

received; that they are thoroughly briefed on whatever aspect or aspects of the agency's operation they are interested in; and that they return home fully informed on what they came for.

During the period under review, FAA welcomed to Washington the civil aviation authorities of 35 nations--some not once, but several times. The visitors, who were thoroughly briefed on matters of interest to them, came from Australia, Belgium, Brazil, Czechoslovakia, Chile, China, Ghana, Iceland, India, Israel, Italy, Iran, Japan, Jordan, Korea, New Zealand, Norway, Pakistan, Panama, Poland, Saudi Arabia, Singapore, Spain, South Africa, Sweden, the Argentine, the Netherlands, the Philippines, the United Kingdom, the U.S.S.R., Turkey, Venezuela, West Germany and Yugoslavia.

A partial listing of what they came for is instructive. Some came for familiarization with the NAS system; some for briefings on such late developments as ATC automation, the microwave landing system (MLS), the discrete address beacon system (DABS), the conflict alert and minimum safe altitude warning (MSAW) systems, the wake vortex avoidance system (WVAS), the wind shear problem, and various environmental impact problems. A number were briefed at their request on primary radar digitizing, the work of the Civil Aeronautical Institute (CAMI), aircrew medical standards, airman certification, the automation of aircraft registry procedures,

long distance semi-automatic flight inspection (SAFI) requirements, and aircraft noise propogation problems. Others were briefed on airport runway paving problems, security screening procedures, the staffing and organization of the FAA Airway Facilities Service, airport management practices and the interface in U.S. practice between military and civil aviation. Still others asked for and were briefed on ARTS III operations, FAA management systems procedures, computer model problems, the methodology of planning forecast projections, current plans for flight service station automation, command system flow control procedures and other FAA activities and practices.

For FAA, this was a familiar activity. It paralleled similar briefings in the International Civil Aviation Organization (ICAO) in support of the agency's two most cherished objectives--the adoption abroad of safety standards comparable to those prevailing in the U.S.; and of air traffic control and airway facility systems which, if not identical, would at least be compatible with them. Clearly, these were objectives that would take time to achieve. Convinced that they could be, FAA was losing no opportunity in briefing the rest of the world on its operations as the best argument it had in seeing to it that they became the international standard.

Farnborough

FAA's participation in foreign air shows is another activity that helps to advance the Nation's international aviation interests. By so participating, FAA is able to present for the consideration of foreign aviation organizations and their decision makers, the engineering achievements and technical advances available to them from U.S. aeronautical manufacturers. A case in point was FAA's participation in September 1976 in Farnborough International 1976, the United Kingdoms' prestigious week-long air show at Farnborough. The theme of FAA's Farnborough exhibit was "Fifty Years of Aviation Progress,"; and the FAA exhibit, in addition to tracing the growth of civil aviation in the U.S. since the passage of the Air Commerce Act of 1926, dealt graphically with the ongoing achievements of the agency in aviation safety, flight inspection and certification. Also very much in point was a further exhibit displaying in graphic fashion the way FAA trained foreign nationals in basic aviation skills.

FAA's exhibit achieved its purpose. The U.S. Department of Commerce, and the air show's 32 American industrial exhibitors credited it with greatly facilitating the on-the-spot sale of American manufactured aeronautical products valued at more than $18.5 million. As in previous years, the exhibit attracted visitors from all over the world, and served to underscore--especially for the developing nations--U.S. primacy in civil aviation.

Bilateral Airworthiness Agreements

Two new bilateral agreements having to do with airworthiness requirements--in the one case with Brazil, and in the other with Poland--were concluded during the period. The bilateral agreement with Brazil was signed just as the period opened; the one with Poland, as it was about to close. The two new agreements brought to 23 the number of such agreements between the U.S. and other countries.

Reflecting the rapid expansion in recent years of the civil aviation manufacturing industry in Brazil, the bilateral agreement with that country covered all of its aeronautical products. As far as the FAA was concerned, this meant that Brazilian-built aircraft met agency standards both in design and manufacture, and could thus be sold in the U.S. and elsewhere as if FAA itself had certificated them.

The groundwork for the agreement was laid by FAA experts who, in visits to Brazil in early 1974, made clear to the Brazilians what the agency's certification requirements were. Then in a return trip to Brazil the following year, the same experts determined that the Brazilian aeronautical industry was fully capable of meeting those requirements.

The agreement which was concluded with Brazil by the State Department, following review of the matter by FAA was a great source of pride and satisfaction to the Brazilians. They had every reason to be gratified by the development, since it would not only enhance the prestige of Brazilian manufactured aircraft (of which the largest then was a twin-engine, propeller-driven, 15 passenger transport), but would help, by that much, to ensure their export sale.

The bilateral agreement with Poland revised and expanded an existing bilateral agreement that had been limited to gliders, to include light aircraft with a maximum gross weight of 12,500 pounds or less, and piston engines of 1,000 horsepower or less. Parts usage was to be limited to items of Polish manufacture except that, in certain circumstances, the U.S. might make an exception on a case-by-case basis.

<u>ICAO Developments</u>

In the three decades that the International Civil Aviation Organization (ICAO) has been in existence, it has served as the principal mechanism by means of which the U.S. has sought to achieve

international action on a broad spectrum of air transportation and air navigation problems. And it has also served as a major forum for presenting to the world the views of the U.S. regarding them.

As a member of the ICAO Council, ICAO's elected governing body, the U.S. maintains a permanent delegation at ICAO headquarters. Its personnel serve as members of the Council and of the organization's major permanent technical body, the Air Navigation Commission. Council and Air Navigation Commission sessions average three per year; and in both, technical preparation and backup for the meetings are largely in FAA hands.

The 15-month period under review was a relatively busy one for FAA as far as its participation in ICAO activities was concerned. During the period, the U.S. participated in 21 ICAO-sponsored meetings ranging from small technical working groups to major conferences; and FAA had an important role to play in each of them.

ICAO activities to which FAA made a major contribution during the period, included:

- The development at an ICAO North Atlantic Regional Air Navigation meeting held at Montreal in August 1976 of minimum navigation separation standards for aircraft operating across the North Atlantic. Implementation of the new minimum separation specifications will permit a reduction in operational separation standards for North Atlantic crossings, thereby substantially increasing airspace utilization in the North Atlantic.

- The advance preparation during July 1976 at a meeting in Miami for a forthcoming ICAO Regional Air Navigation meeting to be held at Lima, Peru, in October 1976. The purpose of the meeting was to update airport and airway facility services required in international civil aviation operations in the Caribbean and South America.

- The selection of a Microwave Landing System (MLS) international standard. FAA continued to press for selection by ICAO of an international MLS standard, compatible with the U.S. developed and sponsored time reference scanning beam system.

- o The establishment at the instance of the U.S., of a special ICAO North Atlantic panel to review the requirements for air navigation facilities and services provided under joint financing agreements with Denmark and Iceland to which the U.S. contributed annually approximately $2.3 million and American aircraft operators contributed another $400,000 in user charges. To the gratification of FAA, which believed these charges to be excessive, the panel submitted recommendations to the ICAO council indicating that it was possible to provide the needed services at a substantially reduced cost.

Technical Assistance and Training

During the reporting period, FAA had available approximately $7 million for its foreign technical assistance and training programs, reimbursable from the Department of States' Agency for International Development (AID), the Defense Department's Military Sales Program and the individual foreign countries concerned. The Department of Defense sponsored three FAA technicians in Iran and four in Taiwan, and technical assistance groups dispatched to Korea, Venezuela, and Oman, were financed by those countries. As the period closed, there were six FAA technical assistance groups abroad with a total authorized staff of 14.

In addition to providing full time resident groups, FAA dispatched 49 technicians in various aviation specialties on short term assignments to 17 different countries. The Law Enforcement Assistance Administration (LEAA) paid for 8; AID, for 5; ICAO, for 3: DOD and the World Bank for one each; and the remaining 31 were funded by the countries concerned. These activities, among others, included the provision of advice to the Egyptian civil aviation system; the evaluation of air traffic control radar in Madrid; help in the establishment of an automated cargo and passenger complex at Taiwan; assistance in the design of airport facilities at Seoul; and advice for the improvement of navigation aids in Venezuela.

The agency also trained 423 individuals from 64 countries in various aviation specialties. ICAO reimbursed the agency for 117; AID, for 36; LEAA, for 16; and the foreign governments concerned for the remaining 254.

Further, under appropriate reimbursable agreements, FAA continued to provide flight inspection services to foreign governments, thereby helping to assure the safety of international air carriers operating in those countries. A total of 23 governments requested and were given this type of assistance.

In addition to the above, a number of major technical assistance programs in the Middle East and Far East were pending as the period closed. The jurisdictions concerned included Greece, Iran, Korea and Singapore. The status of these projects at that time was as follows--

- <u>Greece</u>. The Greek government made a formal request during the period, asking for FAA's help in improving and automating the existing Greek air traffic control system. As a first step, they asked for advice on how to automate the Athens Center. A detailed response to the Greek request was in preparation as the period closed.

- <u>Iran</u>. Following a request from the Iranian Civil Aviation Organization (CAO), FAA completed a study in January 1975 for the modernization of the Iranian National Airspace System (INAS). The study outlined a program to modernize and automate the existing air traffic control system so that it would interface with a modernized air defense system which by the end of 1976 would include 13 military approach control (RAPCON) units, of which four would be provided and installed by FAA, and the remaining nine would be installed by the Iranians themselves with the help of a three-man FAA specialist group dispatched to Iran for the purpose. The study made

detailed recommendations for the improvement of the Iranian air traffic control system, and made full provision for such FAA technical assistance as would be needed to get the job done. The Iranian government had the proposal under review throughout the period and appeared to be close to a decision as the period ended. When approval was received, CAO would formally request FAA to provide a group of specialists to begin work on implementation of the integrated civil-military air traffic control system and other objectives of the central INAS concept.

- Korea. Under an agreement with the Korean Civil Aviation Bureau (KCAB), an FAA advisory group consisting of one full-time and four temporary duty specialists was established at Seoul in February 1976. They were to work with the KCAB for a year in the design and preparation of specifications for the electronic facilities planned for as part of the expansion and modernization of Kimpo International Airport. It was expected that when this phase of the work was completed in March 1977 a new agreement would be concluded with KCAB for the next phase of the project.

- Singapore. In answer to a request from the Government of Singapore (GOS) for technical assistance in establishing a new international airport at Changi, FAA agreed to provide the necessary assistance with the understanding that GOS, which had begun procurement for a long range radar and display system (LORADS) and was known to be leaning to the purchase of a system of American origin and design, went through with the purchase. A decision by GOS was pending as the period closed.

Aviation War Risk Insurance

Under the Federal Aviation Act (as amended), the Department of Transportation Act, and a delegation of authority from the Secretary of Transportation, FAA manages a comprehensive Aviation War Risk insurance program. The program includes three types of war risk insurance: Premium deductible policies, standby insurance binders and non-premium war risk policies, each covering a different situation.

The Premium Program is available to U.S. carriers when commercial war risk insurance is not available on reasonable terms and conditions. A finding that this is the case must be made by the Secretary of Transportation, with the approval of the President, before insurance coverage can be provided under the program. During the reporting period, no insurance coverage was provided or required under this program.

The standby insurance binders go into effect in the event of a major war and cover U.S. civil aircraft engaged in operations conducted in the interests of the United States. As the period closed, 50 aircraft were insured under the plan, representing a maximum contingent liability of $6.012 billion.

The non-premium aviation war risk policies included insurance on 290 U.S. air carrier aircraft under contract to the Department of Defense or otherwise committed to the Civil Reserve Air Fleet (CRAF), and on 60 aircraft under contract to the State Department. The total contingent liability here was $56.015 billion.

There was during the period one unsettled claim for damage sustained by a U.S. air carrier aircraft while under contract to the Military Airlift Command (MAC) during the evacuation of Vietnam and related activities in Cambodia. The claim was not expected to exceed $43,000. Since DOT had an agreement with DOD which provided that DOT would be reimbursed for all claims paid under the non-premium program when the aircraft involved were under contract to MAC, DOT expected to be reimbursed accordingly.

Other Significant International Aviation Developments

In addition to the foregoing, FAA--

- Assisted the State Department in negotiations with France and the United Kingdom, which led to a Tripartite Agreement between the U.S., France, and the U.K., for the monitoring of the ozone layer in the stratosphere. The agreement also provided for such further cooperation as would guarantee that all needed actions were taken to insure that engine emissions from supersonic transports did not foul the stratosphere or degrade the ozone layer.

- Sponsored a meeting in Washington in April 1976 to which it invited the representatives of 15 foreign nations--Australia, Belgium, Canada, Denmark, France, Iceland, Italy, Japan, Norway, Sweden, Switzerland, the Netherlands, the United Kingdom, Turkey and West Germany--to discuss the environmental protection problems with which the agency was faced, and what it was doing to take care of them. Convened in response to the concern expressed by several of the European nations that the U.S. might be moving away from multilateral solutions to environmental problems caused by aviation, the meeting was successful

in allaying those fears in the two days of discussion which followed. Three principal points were made to the foreign conferees: (1) that the agency's statutory responsibilities dictated its environmental actions and that it had no choice but to comply with the law in such matters; (2) that they had the same opportunity as the American public to participate in the rulemaking process when new environmental rules likely to affect them were proposed; and (3) that so far from being unilateral in intent, the agency's environmental proposals in such matters as sonic boom, aircraft noise abatement, improved engine emission standards, etc., were modelled on earlier multilateral efforts by ICAO to establish universally-agreed-upon international environmental standards in those very areas.

- Exchanged information with the Soviets on aviation education programs and agricultural aviation practices, including crop dusting. Following a visit to Washington and familiarization visits elsewhere in the U.S. of Soviet experts in the two areas, officials of the FAA and the National Agricultural Aviation Organization visited Kiev,

Tashkent and Krasnodar, in August 1976 where they observed crop dusting operations and were briefed on the measures taken to protect flight and ground personnel during the dusting process. The Russians paid FAA headquarters a return visit in September, and were given further briefings on American practice in the two areas of interest.

- Completed the McAllen-Reynosa, U.S.-Mexican interphone circuit after lengthy on-site negotiations between the FAA's Southwest Region and local representatives of the Aeronautica Civil of Mexico. This cooperative action gave final sanction to the operations of the local, U.S.-American interphone circuits at Brownville/Matamoras, Laredo/Nuevo Laredo. El Paso/Juarez, Imperial/Mexicali, and San Diego/Tijuana. Further such cooperation was achieved earlier in the period with the approval of procedures by the El Paso/Juarez towers for the joint use of Mexican and U.S. airspace in the El Paso/Juarez area. The agreement was of particular advantage to the U.S., because back course ILS procedures to one of El Paso's runways required the use of approximately 5 miles of Mexican airspace. Similar working level cooperation was achieved by the Southeast Region at other U.S.-Mexico border locations.

- Accomplished the initial inspections and on-site aviation security checkouts required under FAR 129.5, of foreign airports and air stations used by foreign air carriers as last points of departure for flights into the U.S. Intra-agency responsibilities for these inspections by geographic area were as follows: the Northwest Region (ANW), for Western Canada; the Southern Region (ASO), for the Caribbean and Central and South America; the Southwest Region (ASW), for Mexico; the Asia-Pacific Region (APC), for the Pacific and the Far East; and the FAA headquarters International Security staff, for Eastern Canada, Bermuda, Europe and the Middle East. In all cases the airports and air stations required to be inspected under the FAR to insure that prescribed security practices were properly observed, were checked out during the period with the full cooperation of the foreign civil aviation authorities concerned.

- Forwarded a proposal to the Libyan Ministry of Aviation at the Ministry's request for training their air traffic control instructors in the principles and techniques of air traffic control

instruction. The request was received by and taken care of by the FAA Academy at Oklahoma City, which is the authority in such instruction..

- Transferred the functions and personnel of the FAA office at Beirut, Lebanon, to the FAA office at Frankfurt, Germany, when the bloody fighting at Beirut in late 1975 made it difficult for the facility to continue. The Beirut office, an outpost of the FAA's Europe, Africa, Middle East Region (AEU), had consisted of an operations inspector, a maintenance inspector and an avionics and electrical systems inspector, whose mission had been to see to it that American registered aircraft arriving at Beirut, were in airworthy condition and complied with the applicable Federal Aviation Regulations.

Chapter 6

POLICY DEVELOPMENT AND REVIEW

This function is discharged by an FAA Associate Administrator under whom are three major headquarters planning offices. The three are: the Office of Environmental Quality (AEQ), the Office of Aviation Policy (AVP) and the Office of Aviation System Plans (ASP). Each deals with a portion of the policy development and review process in the key areas of environmental planning, aviation industry surveys, aviation economics, aviation forecast projections, aviation futures analysis, industry financial policy projections, energy conservation, consultative planning and aviation systems planning. What these three offices do, provides a basis for the development of essential policy decisions FAA must make to meet effectively the long-term needs of civil aviation. The activities of the period in these three planning areas will be considered in turn, beginning with the environmental planning responsibility.

Protecting the Environment

Public Law 90-411, calling for "aircraft noise abatement regulations to afford present and future relief and protection to the public from unnecessary noise and sonic boom," was signed into law on July 21, 1968, as an amendment

to the Federal Aviation Act of 1958, thereby adding the abatement of aircraft noise to FAA's responsibilities for the first time. Two years later, Congress made EPA and FAA responsible for the control of aircraft engine emissions. It did so in Public Law 91-604, the Clean Air Amendments of 1970, passed on December 31, 1970. The amendments specifically gave the Environmental Protection Agency (EPA) the responsibility to promulgate necessary aircraft engine emission standards, which FAA would implement and enforce if their implementation was not hazardous to safety.

Congress followed this on October 27, 1972, with Public Law 92-574, the Noise Control Act of 1972, which, in a further amendment to the Federal Aviation Act, specifically defined the respective responsibilities of FAA and EPA in the control of aircraft nosie. EPA's role under the act was to recommend noise standards to FAA based on considerations of public health and welfare. FAA, in turn, was to consider the recommendations and determine for itself whether the standards proposed by EPA were consistent with safety, economically reasonable and technologically practicable for the type of aircraft, aircraft engines, or appliances for which the rules were proposed. If they were, the agency would

follow through with the appropriate regulatory action, and if no valid reason appeared why the rules should not be put into effect, FAA would implement and enforce them.

Except for environmental requirements laid down in the Airport and Airway Development Act of 1970, and the Airport and Airway Development Act Amendments of 1976, which are dealt with elsewhere under the airports function, these three acts provide the basis for the agency's environemntal protection efforts, both as regards the control of air pollution and the abatement of aircraft noise.

The agency's formal environmental activity was initiated in November 1969 with the publication of FAR Part 36, Noise Standards: Aircraft Type and Airworthiness Certification. This pioneering FAR set noise standards for new subsonic transport airplanes. In October 1973 these standards were extended to newly produced subsonic jets of older design, and were followed in turn by a whole succession of notable air pullution and aircraft noise abatement developments.

These developments included the issue of a rule setting maximum noise levels for propeller-driven small aircraft; the tightening of conditions under which modified versions of existing aircraft were tested to establish compliance with

noise standards prescribed in FAR Part 36; the broadening of a special rule prohibiting large turbojets from discharging residual fuel from manifolds into the atmosphere; and the initiation of a study to determine to what extent harmful turbine engine emissions increased with engine use. The FAA also established a follow-on, high altitude pollution prevention program to determine what harm significant increases in stratospheric flight would do to the environment.

Some of these actions--though by no means all of them--were in response to EPA recommendations. Not all EPA inputs could be used, however. For instance, when FAA completed its analysis of EPA proposals for the abatement of noise in approach and landing procedures, it decided to promulgate only a portion of the EPA proposals. In one case it rejected a proposed two segment approach for safety reasons; in another it considerably modified an EPA minimum flap rule proposal. The EPA formula for reducing the noise level in the existing air transport fleet, a high percentage of whose older aircraft still exceeded the noise levels prescribed in FAR Part 36, was found to be unworkable and a much preferable alternative approach was initiated. Similarly, an FAA alternative

proposal for bringing the noise levels of the older aircraft in line was followed since it guaranteed quicker and better results than the EPA proposal.

The consultative arrangement established between FAA and EPA by the Clean Air Amendments of 1970 and the Noise Control Act of 1972 continued throughout the period. It was a fruitful relationship and the reporting period a busy one. During the course of the 15 months, FAA--

- Issued the Federal Aviation Administration Five-Year Environmental Plan, 1976-1980, defining agency environmental policy and setting forth a 5-year program for its implementation.
- Approved a major new study project addressed to the establishment on an analytical basis of goals and priorities for an effective system-wide noise regulation effort.
- Completed an analysis of the regulatory action required to insure that all jet transport aircraft met the noise requirements of FAR Part 36. The analysis considered the retrofit of older in-use aircraft, as well as their replacement with newly produced aircraft of current and future design.

- Published an NPRM to lower still further FAR 36 noise level requirements for transport category aircraft and turbojet aircraft regardless of category. The new levels sought reflected state-of-the-art advances in the technology of aircraft noise abatement.

- Issued a rule implementing EPA smoke standards for turbojet engines of over 29,000 pounds thrust as used by such wide-bodied jets as the B-747, the DC-10 and the L-1011.

- Promulgated a directive on the control of air pollution at agency facilities. The directive emphasized the agency's responsibility to assume a posture of leadership in the control of air pollution.

- Issued an NPRM submitted by EPA which specified aircraft noise requirements for U.S. and foreign air carrier aircraft operating to and from U.S. airports. The proposal was addressed to preventing the operation to or from airports in the U.S. of civil transport category airplanes, foreign or domestic, unless they complied with the noise level requirements for subsonic transport category aircraft prescribed in FAR Part 36, or had flight time before December 31, 1974.

- Issued a Final Environmental Impact Statement (EIS) in February 1976, on the application of Air France and British Airways to conduct limited commercial operations with the British-French Concorde supersonic transport (SST) in Kennedy International Airport in New York and Dulles International Airport near Washington. Following the hearing on the final EIS in January 1976, the Secretary of Transportation directed the Administrator to amend the operating specifications of Air France and British Airways to allow limited scheduled commercial flights of the Concorde into the United States for a trial period which was not to exceed 16 months. Working with representatives of NASA, EPA and the Office of the Secretary, FAA developed plans and procedures for the noise, sonic boom and low altitude pollution monitoring of the Concorde in order to determine the environmental impact of its operations during the trial period. Various types of noise and emission monitoring equipment were installed at Dulles and surrounding communities, and most were in operation on May 24, 1976, when Concorde service to Dulles began. The data was to be collected and reported publicly on a monthly basis for the next 16 months. At the end of the period, the data would be consolidated and compared with the final EIS for such further action as was appropriate at the time.

- In addition to assisting the State Department in establishing the tripartite stratospheric ozone layer monitoring program previously referred to, signed a memorandum of understanding with EPA, NASA, NOAA and DOD, setting forth in detail the technical efforts each would be responsible for in the conduct of the program.

- Under its High Altitude Pollution Program (HAPP), continued to study emissions from aircraft engines operating in the stratosphere and to conduct field and laboratory experiments having to do with stratospheric phenomena and the development of theoretical models of stratospheric behavior.

- Held public hearings in November 1975 on three alternative turbojet approach noise abatement proposals submitted to it by EPA. The proposals called for either reduced flap settings, visual two-segment approaches, or two segment ILS approaches. EPA's argument for the reduced flaps proposal was that an approach made with less than full landing flaps would produce less noise than a full flap approach and require less power. Its argument for the two-segment visual approach, in which aircraft would use glide angles of three and six degrees during VFR weather conditions, was that noise

reduction would result from the increased altitude and lower power settings that the procedure would make possible. For the two-segment ILS approach, it argued that while the procedure required the installation of glide slope computers, its steep, high altitude approach would not only be relatively quiet but could be used in all weathers.

The upshot of the hearings was a decision by FAA to require the use of minimum landing flaps and to initiate rulemaking to set 1,000 feet as the highest altitude at which the pilot could select landing flap settings.

- Published for public comment a revised FAA order--Headquarters Order 1050.1B, Policies and Procedures for Considering Environmental Impacts--implementing the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969 and other related environmental laws and directives. The order was to give guidance on what to look for in documenting environmental factors of significance in dealing with parks, historic sites, wet lands and coastal zones, especially as regards the noise, air and water quality issues involved.

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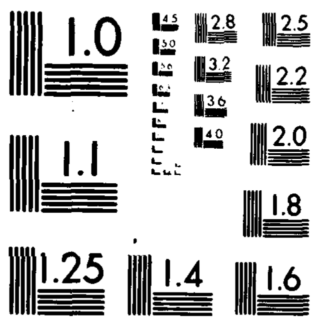

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- Held public hearings at 25 cities across the Nation to obtain public comment for the development of a national airport noise policy. The hearings were well attended, and in addition to the oral presentations at the hearings, more than 300 letters were received from the public and industry. All these materials were used by the agency in developing the desired policy statement which was in an advanced state of preparation as the period closed.

The Aviation Policy Activity

FAA prepares and publishes annually a 10-year national forecast of aviation activity of which the latest edition was Aviation Forecasts, 1977-1988, published in September 1976. The forecasts supply a wide variety of data useful in civil aviation planning. Included are forecasts of passenger enplanements, passenger revenue miles, air cargo projections, air carrier and general aviation fleet level and activity level projections, engine and aircraft production forecasts, as well as forecasts of air carrier, general aviation, and military activity at major terminals and air route traffic control centers. An extremely useful piece of work, the publication pinpoints current and future trends; and, as such, not only supports internal planning and budgetary projections of all kinds, but provides industry

and the public with an authoritative indicator of which way civil aviation will go in the years ahead.

In addition to this versatile planning tool, FAA produces a great many other planning and forecast studies which are also exceedingly useful in policy formulation. A few, published during the period, are worth citing. They include--

- o <u>General Aviation Forecasts, 1975-1987, State, Regional and National Operation.</u>
- o <u>A Study of Attrition in the Domestic General Aviation Fleet.</u>
- o <u>Profiles of Scheduled Air Carrier Airport Operations--Top 100 U.S. Airports.</u>
- o <u>Profiles of Scheduled Air Carrier Operations by Stage Length for FAA Regions and Top 100 U.S. Airports.</u>
- o <u>IFR Aircraft Handled--Forecasts by Air Route Traffic Control Centers, Fiscal Years 1977-1988.</u>
- o <u>Terminal Area Forecasts 1977-1987.</u>
- o <u>Military Air Traffic Forecasts, 1977-1987.</u>

The FAA aviation policy activity uses other policy development aids. They include, among others, a national aviation system (NAS) model and continuing alternative futures studies.

The NAS model is particularly useful because it has the capability of simulating relationships between NAS activities, thereby providing a means to anticipate the effects of systems changes before the changes are made. It also makes it possible to weigh the system-wide consequences of proposed regulatory actions, changes in demand and technological change. It is also of value in putting the finger on system constraints, problems which require deeper analysis, and developments which take an unexpected turn and therefore merit further study.

The methodology of the alternative futures program bases itself on the fact that civil aviation is a key component of the national economy, and studies it in that context. By working out hypothetical alternative socio-economic scenarios for the economy for the 1990's and beyond, it is able to come up with alternative aviation system profiles for the period, which if they are different in the individual case because of the differences in scenario, are nevertheless useful in providing insights into what to expect in the future and how best to deal with

it. Since these alternative futures are built conceptually with tools which are at once both analytical and matters of judgment, they are neither predictions nor forecasts. Nevertheless they make it possible to anticipate realistically the likely course of future aviation developments, and to make clear what the major issues with which civil aviation is likely to be faced, will be.

In the short and intermediate term, the FAA forecasting effort is principally used for budgetary projections. In the long term, the NAS model and the alternative future programs come into play and provide a wide range of possible answers to key problems of the national aviation system in the 1990's and beyond. Comparing the data derived from the NAS model with the output of the alternative futures approach provides a further check on potential future system deficiencies. It also serves to alert the agency to take such actions as seem appropriate to prevent those deficiencies from realizing their harmful potential.

A principal Aviation Policy initiative of the period had to do with the implementation of PL 94-163, the Energy Policy and Conservation Act signed into law by the President on December 22, 1975. Directive upon industry and all

levels of government, the act laid out new policy directives for the conservation of the Nation's energy resources and their more efficient use.

The act called for a 10 percent increase in fuel efficiency in aviation over the year 1972 and required that FAA report to Congress how that goal was to be achieved. FAA answered with two reports: one in February 1976; the other in April 1976. In the first report, it detailed the fuel savings achieved in conjunction with the aviation industry since October 1973. In the second report, it listed the options open to it and to the industry for further savings. These included among others: revised climb and descent profiles; improved fuel advisory departure (FAD) procedures; and use of the Wake Vortex Avoidance (WVAS) System in landing operations.

Profile descent procedures for high performance aircraft defined as an idle, unrestricted descent at idle, or near idle thrust, were being developed, the report noted, because of the benefits to be gained in fuel savings and reduced aircraft noise. The procedures were aimed at making maximum use of profile descent from cruise altitude to final approach. Beginning at least 10,000 feet above the terminal, they would preclude holding or excessive vectoring at altitudes below that level for spacing or delay purposes. They would also provide for the metering

and spacing of arriving aircraft at high density terminals, thereby ensuring further fuel savings.

The FAD procedures, in turn, saved fuel by significantly reducing delays within the system. These procedures had been incorporated into the new Flow Control procedures and further fuel savings were to be expected as a result. When fully developed, the Wake Vortex Avoidance System would ensure fuel savings by reducing landing delays.

Other important Aviation Policy initiatives of the period included the following--

- The holding of the First Annual Forecast Review Conference which over 150 persons representing aviation system users and the aviation industry attended. The object of the conference was to review the official FAA forecast of aviation activity for fiscal years 1976-1988, which had just been published, and to learn of the major improvements in methodology used by the agency in its preparation.

- The publication of additional economic studies to provide data for, and insight into, current aviation industry problems. Included were an analysis of the helicopter industry, the results of a survey of general aviation ownership and a report on the general aviation trends and problems of the period.

- The guarantee under the Aircraft Loan Guarantee Act of 1957 of 11 loans to eight small airlines in the amount of $122.7 million during the period. The loans which these carriers could not obtain otherwise on reasonable terms, were for the purchase of aircraft, spare parts and equipment needed to improve the efficiency of their operations and the quality of their service to the public. As of the end of the period, 36 loans totalling $215.5 million had been guaranteed under the program.

- The completion of a 2-year experimental effort to identify and describe five alternative scenarios having to do with the possible future course of civil aviation to the year 2000. A final report was prepared for use in matching up the different scenarios with aviation policies deemed to be appropriate in the individual case.

- The preparation of a policy statement to be used as guidance in the development through the 1980's and beyond of the two Federally owned metropolitan Washington airports--Washington National Airport (DCA), and Dulles International Airports (IDA). The impacts of a broad range of

policy alternatives were identified and evaluated and the possible repercussions of policy options on airport users and the environment were systematically reviewed. It became clear as the work on the policy statement progressed, that the final result would represent a balance between the service which had to be provided, the environmental factors involved and the funding required.

- The initiation of a study of congestion and delay in the terminal access roads and parking areas of large commercial airports; and the consequent acute landside access problems at those airports. An object of the study was the development of a computer model which would allow FAA to test the impact of a wide range of airport planning alternatives on landside congestion at major U.S. airports:

System Planning Contributions

The contributions for the period of this activity derived from its three principal functions: Consultative Planning; National Aviation System facility planning; and preparation of the National Aviation System 10-Year Plan. The three were all part of the same function, and

addressed themselves in their separate ways to one overriding objective: the enhancement of the effectiveness and economical operation of the National Aviation System. A discussion of their accomplishments for the reporting period, beginning with consultative planning, follows.

FAA has long made it a practice to consult with the aviation community, industry and the general public to obtain their ideas on key issues with a view to using them in its planning process. The agency secures these ideas in consultation with user groups and others in the course of NAS facility planning, preparation of the NAS 10-Year Plan and in other formal and informal contacts with the aviation community, industry and the public. But most important of all, it secures them in public meetings with these various elements. Eleven such meetings were held during the period. They included an Aviation Review Conference, an Aviation Executive Conference, a Consultative Conference on Separation Assurance and seven listening sessions with selected aviation groups.

One of the most important of the 11 meetings was the Aviation Review Conference which was held in Washington in late May 1976. The meeting, which ran for 3 days and was attended by more than 700 people from all branches

of civil aviation, featured congressional and industry speakers and government and user panel discussions on a wide variety of topics--all of them of value in bringing into focus the ideas of the participants on the key issues involved.

The Aviation Executive conference was held earlier in May at Tampa, Florida. Fifty top executives, including representatives of industry, the aviation associations and government, listened to presentations and exchanged views on a variety of topics of value to the system planning process.

The Consultative Planning Conference on Aircraft Separation Assurance was held in Washington in late September 1976, just as the period was closing. The conference which was attended by 85 invitees representing the airlines, the aircraft industry and the military, ran for two days. FAA experts gave presentations on all aspects of the problem and participants joined in the ensuing discussions which were duly recorded for future policy use.

The listening sessions were held at different times throughout the period, and for the most part in Washington. The seven aviation groups met with included air taxi

operators, airport operators, flight attendants, aviation businessmen, private pilots, safety representatives and business aircraft operators.

The fact that the agency's facility establishment planning function has the responsibility for developing establishment criteria for NAS facility equipment costing millions of dollars annually, means that the agency has to be sure that the criteria as so developed are sound and objective and represent the best possible choices that can be made in the circumstances. It has to be sure, in short, that the facilities are established where they are most needed and that their installation there can be justified by the best, most objective criteria possible.

During the period, FAA developed such criteria on a location-by-location, cost/benefit basis, for instrument landing systems (ILS's), airport traffic control towers (ATCT's), airport surveillance radars (ASR's) and visual approach slope indicators (VASI's). Cost/benefit analyses were prepared for each type of equipment and criteria were developed which permited informed choices

to be made between competing locations. The criteria made it possible to determine objectively where the component was most needed; where, though the need was perhaps less, it was still desirable that it should be established; and where, in the light of the criteria, its establishment could not be justified.

The facility criteria procedure was in two phases. In Phase I, FAA field elements identified locations where specific types of equipment appeared to be called for and gave the best cost/benefit justification they could for establishing them there. In Phase II, FAA using more refined cost/benefit techniques, screened and ranked the candidates, chose those that were most needed, and discarded the rest.

With the materials available to it from NAS operations and its consultative relationship with the aviation community, the aviation system planning activity was in an admirable position to prepare what was, without question, the single, most valuable planning document to be put out by the agency--the FAA National Aviation System 10-Year Plan. The FY 1976 edition of the plan was particularly notable for its focus on safety, productivity, energy and environmental compatibility. Named the National Aviation System, Challenges of the Decade Ahead, its object was to provide planning,

programming and budgetary guidance for the 10-year period 1977-1986. It was published in May 1976; and in addition to being distributed at the Aviation Review Conference held later in the month, was used with great success throughout the agency as one of its basic planning documents.

Chapter 7

THE METROPOLITAN WASHINGTON AIRPORTS ACTIVITY

The Metropolitan Washington Airports (MWA) organization--since July 1, 1975, an FAA field unit, and before that an FAA headquarters service--operates the two Federally owned airports serving the Nation's Capital--Washington National Airport (DCA) and Dulles International Airport (IAD). This is a responsibility that the agency has had since the two were built and began operating--Washington National in 1941, when it came under FAA's immediate predecessor, the Civil Aeronautics Administration (CAA); and Dulles International in 1962, when FAA, as such, was in its 4th year.

National Airport with 680 acres is by far the smaller of the two airports. It does, however, have the advantage of being located just 2.5 miles and about a 10-minute drive from the White House. By contrast, Dulles, comprising 10,000 acres, is 27 miles from the White House and the drive takes from 40 to 60 minutes depending upon the traffic. National has three runways. The longest, 6,870 feet, is the only one of the three instrumented for ILS landings and for that reason is the one most used by airline aircraft. Dulles, on the other hand, has two parallel runways 11,500 feet long and a cross wind runway extending 10,000 feet, all ILS instrumented.

The airline aircraft in use at National include principally B-727, B-737 and DC-9 series aircraft. Dulles serves all the jets including the supersonic Concorde transport and the wide-body B-747's, DC-10's and L-1011's.

Even though scheduled airline jet service is available at National only from 7 a.m. to 10 p.m. (a 15-hour day), the airport serves many more passengers annually than Dulles. There are two principal reasons why passengers prefer National to Dulles. The airport is located close to the city center and the airlines provide 40 scheduled flights an hour.

THE DCA/IAD ENIGMA

Dulles was one of the first airports planned and designed to serve jet aircraft. Planners anticipated that Dulles would provide the Nation's Capital with a gate-way to the entire world. The airport was designed to serve the large four-engine jets in international service and to handle domestic flights should these be moved from National to Dulles. Forecasts made about the time that Dulles was under construction determined that passenger volume at National, with the propeller-driven aircraft then in use, would peak out in the late 1960's with an annual volume of abo[illegible] mil[illegible]sengers, and that Dulles would then gradually overt[illegible] surp[illegible]onal in the number of passengers served.

When the first large four-engine jets went into use, it was thought that jets in addition to being a more costly form of air

transportation would require special runways for successful operation as compared to propeller aircraft. It was assumed, therefore, that Dulles with its long runways, convenient mobile lounges, and superior terminal building would quickly become the National Capital Area's dominant airport and that National, serving the propeller planes, would have an increasingly less important role to play in the area's airport operations.

What the planners failed to foresee was the development of two- and three-engine jets which would be able not only to land on runways of the nation's older airports, such as National, but would also be capable of carrying many more passengers and be much more economical to operate than the prop planes then in use. In April of 1966, FAA decided to permit the two- and three-engine jets to operate at National. Gradually the airlines began to phase out older aircraft and to replace them with new jets. National's passenger volume continued to climb and year after year to far outstrip Dulles--a process that continues unabated to this day.

In its first full year of operation, Dulles handled 666,669 passengers to National's 5 million. Two years later, in 1965, the figures were: Dulles, 994,440; National, 6.9 million. Undaunted, the planners predicted that Dulles would surpass National by 1975, if not sooner. That didn't happen either. The figures for FY 1975 were: Dulles, 2,517,895; National, 11,230,286. For FY 1976 they were: Dulles 2,727,129; National, 11,827,342. For FY 1976 plus the Transitional Quarter, they were: Dulles, 3,527,344; National, 14,957,002.

The bottom line was that while National, with a million passengers a month, was the 8th busiest airport in the country during the period,

Dulles, with 235,000 a month, was the 40th busiest. Clearly Dulles still had a long way to go to catch up with National, let alone surpass it.

But catch up it will, because of National's environmental problem and the fact that with three airports to serve the National Capital Area—National, Dulles and Baltimore-Washington International at Baltimore—a better balanced division of the traffic between all three is inevitable. Indeed, it is expected that by the mid-1980's all three facilities will be working hard to meet the demand forecast for the National Capital Area.

The National Capital Area is fortunate in another way. It's two Federal airports could not be duplicated today at anywhere near their original cost. National cost $13 million to build, mostly in Public Works Administration funds; and Dulles—Eero Saarinen's masterpiece, and one of the Nation's and the world's great architectural triumphs—was built at a cost of $108 million. Viewed from the vantage of the 70's, the $121 million it cost to build the two must surely rank as one of the great bargains of the century.

MWA: The Operational and Fiscal Statistics

Operations at the two airports by operator category for the 15-month period were:

	National	Dulles
Air carrier	250,565	71,541
Air taxi	51,495	13,191
General aviation	92,862	118,421
Military	747	28,924
Total	395,669	232,077

Passengers handled during the period by these various operator categories, were:

	National	Dulles
Air carrier	14,208,714	3,325,598
Air taxi	520,467	25,698
General aviation	227,821	127,670
Military		48,378
Totals	14,957,002	3,527,344

Mail and freight handled at the two airports during the period, in pounds, were:

Mail	101,055,971	39,419,449
Freight	99,242,280	85,754,536
Totals	200,298,251	125,173,985

Appropriations in the FAA budget to keeping the two airports in operative condition, were:

Operations and Maintenance	$11.7 million	$11.3 million
Construction	2.5 million	3.2 million
Totals	$14.2 million	$14.5 million

Required by law to recover its airport operational and capital improvement costs, MWA was, on the whole, successful in doing so. Revenues for the 15-month period from its 192 tenants at the two airports totalled $34.9 million. Of this amount, the 93 tenants at National paid 21.2 million; the 95 tenants at Dulles, $13.7 million.

National, with an operating income of $9.9 million, realized a profit of $7.5 million for the period. Dulles, on the other hand, though clearing a profit of $2.6 million in the same time span, registered a net loss of $4.8 million, thanks to depreciation and carrying charges which totalled $7.4 million. The net profit for the two airports for the 15-month period was thus $2.7 million, most of it attributable to National.

Managing the Two Airports: The Problem Areas

The two airports have few problems with the air traffic control side of their activities which are basically the province of ATC experts assigned by FAA's Eastern Region. But each does have problems, though not necessarily the same ones.

Dulles' basic problem is underutilization--a problem which time will eventually take care of. Dulles has ample vehicular parking space, and except for its distance from the city no significant landside access problems. Its environmental posture is good, not only because it is in the country, but also because the communities immediately contiguous to it are relatively sparsely populated. The only environmental compatibility development of consequence there

during the period occurred in February 1976 with the installation of noise and emission monitoring devices at Dulles to determine the environmental impact of British Airways - Air France Concorde service to Dulles for a 16-month trial period.

The problems are greater at National. Surrounded by dense centers of population and forced to conduct its business with a catastrophic lack of vehicular parking spaces, poor access by road, and an inadequate traffic circle in front of the terminal, National suffers severely from environmental compatibility and landside access problems.

Follwing complaints in the Cabin John, Md. area about the aircraft noise there, the agency toward the end of 1975 sought to change the turn-off point of flights leaving National from a point over Cabin John to one over McLean, Va., on the other side of the Potomac, only to run into protests from Virginia officials when it sought to do so. The lesson was not lost on the agency which began laying the groundwork during the period for scientifically worked out flight path changes which could be relied on to disperse and minimize

the noise over the various metropolitan Washington area locations concerned, and to that extent, achieve a better degree of environmental compatibility than before between National and the communities surrounding it.

In early March 1976, the Administrator announced formation of a special committee made up of the directors of MWA and the Eastern Region, representatives of the Air Transport Association (ATA), and the Metropolitan Washington Council of Governments (COG) to deal with the problem. Working groups began devising new departure and arrival flight paths as alternatives to those in use that were causing complaints. In addition MITRE Corporation was retained to compute the noise levels to be expected over the various areas the proposed flight paths would take. It was planned to have representatives of COG present the alternative flight paths to local residents for their consideration in a series of public meetings which would be held throughout the Metropolitan Washington Area as soon as the new flight path proposals were fully worked out and documented.

Of National's several landside access problems, one--the problem of the unlicensed "gypsy" taxicab drivers--was satisfactorily taken care of during the period. Under the

previous open taxicab system in use at National, unlicensed gypsy drivers, who flocked there, had been notorious for overcharging the public, providing it with exceedingly poor service, and, in effect, preying upon it. The situation went from bad to intolerable; and on October 14, 1975, FAA issued a Notice of Proposed Rulemaking under FAR Part 159, National Capital Airports, proposing the additional regulation of taxicab operators serving National and Dulles.

Following a public hearing on the problem, a rule was adopted under the FAR effective June 13, 1976, requiring all taxicab drivers carrying passengers for hire at National or Dulles to be licensed in one of the seven local police jurisdictions and to be subject as well to specific requirements laid down in the regulation. Under the rule an aggrieved passenger could bring his complaint to the attention of the local authority which licensed the taxicab operator, and if warranted bring charges against him.

The rule worked extremely well. It banished the unlicensed taxi drivers from the two airports and ensured that the licensed drivers--the only ones who could now ply their trade there--provided a service in keeping with the requirements of the FAR and their licenses.

The vehicular parking difficulty--National's most aggravated landside access problem--was not taken care of that easily. The problem itself was starkly simple. National needs at least 2,000 more public parking spaces than the 4,000 it has room for. Even so, occasional improvements are possible. Thus during the period, space was found for a new parking lot and an existing lot was expanded, providing altogether 500 new parking spaces--no great figure in itself but a very welcome addition in a very tight situation.

To improve traffic flow on the airport, the traffic circle in front of the main terminal was redesigned for use as a short term parking facility. In addition, a construction project was undertaken to convert the main airport roadways converging on the terminal into a one-way system. The project was a success in that it improved traffic movements onto and off the airport and to that extent helped to relieve the congestion. Another advantage was that it enabled motorists to bypass the busy circle in front of the main terminal if they so desired. More extensive roadway improvements are contemplated.

PLANNING FOR THE FUTURE

Notwithstanding that the two airports have essentially the same mission and are under the same management, it has hitherto not been possible for FAA to mandate some sort of a balance between the traffic that each handles. Every attempt to do so has run into difficulty. It had only to advance proposals for shifting flights from National to Dulles, to meet strong opposition from the airlines flying in and out of National, as well as from elements in Congress, who, with service at National so close, had no desire to go elsewhere for it.

The airlines were strongly opposed to shifting profitable flights from National to Dulles as long as Dulles ran a poor second to National in public preference. The members of Congress, most vocal in the matter, were just as strongly opposed to letting FAA shift flights to Dulles that they were accustomed to taking from National. Not only that, but they made it very clear when FAA proposed doing so with flights to Chicago and Minneapolis that they would have no part of shifts of that sort either.

In such circumstances, FAA could do little to achieve a rational balance between the two airports. It did what it

could. It set a limit to National's operations, and limited the long distance jets to Dulles, and the medium distance ones to National. But even this division of labor had its painful side-effects, especially at Dulles. Under the operational pattern in effect there, the long range West Coast flights arrived and departed Dulles at precisely the same time that long range flights departing Europe arrived. As a result, Dulles was extremely busy for a few hours in the late afternoon and early evening, and far from busy the rest of the time.

To be sure, things were going better at Dulles. The airport's air freight and air taxi operations were growing dramatically, and it was clear that there would eventually be a substantial escalation in its air carrier enplanements. Thinking to be forehanded in the matter, the agency began revising the Dulles Master Plan, to include among other improvements a fourth runway, which, if things went as forecast, would be crucially needed later on.

It was quite clear, however, that the Master Plan, which assumed a proper balance between the airports as one of its basic premises, would do little by itself to achieve such a balance. On the other hand, the Metropolitan Washington Council of Governments (COG) had completed a study in September 1975 which showed a way out of the dilemma. In

that study, COG projected a situation in which by the end of the century, Dulles and Baltimore-Washington International (BWI) Airport at Friendship, Md., would handle the bulk of the Metropolitan area's passenger enplanements between them, and National would handle the rest. This would be achieved by retaining National as an active air terminal in the years ahead, while at the same time limiting its activity in order to reduce air pollution and aircraft noise in its surrounding area.

If such a recommendation was followed, it would help expand traffic at Dulles and BWI, while permitting National to continue serving a useful but less dominant role than in the past. With the COG study and earlier FAA-OST studies and investigations as backup, FAA began working on a definitive policy statement late in the period which was to be used as a guide in the development of the two airports in the decades ahead. It was safe to assume that that statement, like the COG study before it, would have a great deal to say on what needed to be done to achieve a better balance between the two than had previously been possible.

Chapter 8

EMERGENCY PREPAREDNESS

Under Executive Order 11161, July 8, 1964, as amended by Executive Order 11380, November 29, 1967, the Secretary of Transportation and the Secretary of Defense are required to prepare plans for the probable transfer of FAA to the Department of Defense in the event of war. Under Executive Order 11490, October 30, 1969, the Secretary of Transportation is assigned certain national emergency air transportation functions which he has delegated to the FAA Administrator. FAA's basic emergency operations mission is, therefore, to provide both Secretaries with all required operational support during a national emergency. To be ready to do so, the agency maintains an emergency operations staff in headquarters; emergency operations officers at all the regional headquarters, the Aeronautical Center and NAFEC; and at air route traffic control centers (ARTCC's) designated as emergency operating facilities. It participates in emergency preparedness exercises; sees to it that emergency communications networks are working properly; that emergency rations and other essential supplies which must be in place in an emergency are available in sufficient quantity at all emergency operating locations; and that it is to the fullest extent possible in a position to effectively discharge its responsibilities to the two Secretaries in a national emergency.

The Emergency Functions

The specifics of what FAA's emergency functions would be during and following an attack on the United States and during certain transportation emergencies, were set forth by the Department of Transportation in October 1974. They included the following: to maintain the continuity of the National Airspace System; to act as a claimant for air carrier, general aviation and airport resources; and to manage on an emergency basis the Nation's civil airports, civil operating facilities, civil aviation services and its civil aircraft, other than air carrier aircraft.

FAA itself followed this with a revised Emergency Operations Plan, published as FAA Headquarters Order 1900.1B on May 12, 1975, which set forth in detail FAA's emergency responsibilities in the event of a national emergency. The plan provided for the monthly testing of the agency's emergency teletype and radio communications networks; laid down emergency procedures it was to follow in claiming needed civil aviation resources; provided guidance on how the agency would operate under radiological fallout conditions; and set up a system for periodically evaluating the effectiveness of its emergency readiness program.

The Rations Problem

For years, the practice in emergency preparedness had been to stockpile emergency rations at the ARTCC's and emergency operating facilities (EOF's), and to have the Defense Supply Agency (DSA) rotate them periodically so that fresh rations were always available. In the post-Vietnam period, with a decrease in both demand and stock levels, DSA stopped rotating the rations. The shelf- life of the available rations expired, and the ARTCC's and the EOF's were left without sufficient rations for an emergency.

A solution to the problem was quickly worked out. In January 1976 FAA headquarters transferred funds to the Aeronautical Center and gave the center the responsibility of buying and distributing the required rations. The objective was to ship a 5-day supply of new pack combat rations to each EOF and ARTCC, and to keep them stocked at that level thereafter.

This was a peace-time level and would quickly run out in any emergency lasting more than a few days. How the problem would be handled in such a case was made clear by the Secretary of Defense in a memorandum to the three service secretaries in June 1976. In the memo, the Secretary directed that in emergencies U.S. military installations adjacent to FAA control facilities would make suitable

arrangements to provide them with emergency support including rations to the extent that they could do so without interfering with their basic military mission.

Pole Vault 76/Rex 76

In early March 1976, FAA participated in Exercise Pole Vault 76, sponsored by the Joints Cheifs of Staff (JCS), and Exercise Rex 76, sponsored by the Federal Preparedness Agency (FPA). The two were essentially the same exercise, except that the objective of Pole Vault, the military side of the exercise, was to reestablish lines of authority and reconstitute the worldwide military command and control system following an enemy strike, while the objective of Rex 76, Pole Vault's civilian counterpart, was to preserve the continuity of Government and to assess its residual capacity to function following such a strike.

During the exercise FAA served as an adjunct of the Department of Defense with the mission of restoring to operation the National Airspace System in accordance with

priorities established by JCS. This gave it the opportunity to put into effect FAA-wide all applicable emergency plans and procedures. It was also able to test the effectiveness with which it implemented a variety of post-attack tasks, some of which had never been tested before. These included (1) ARTCC contingency plans; (2) FAA War Air Service Program (WASP) responsibilities; (3) Security Control of Air Traffic and Air Navigation Aids (SCATANA); (4) States and Regional Disaster Airlift (SARDA); (5) Continental Airborne Reconnaissance for Damage Assessment (CARDA); (6) DOD response to provisions of the DOD/FAA Memorandum of Understanding, including military support to critical FAA facilities while the latter were serving as an adjunct of DOD.

FAA participation in the exercises included selected headquarters services and all the regional headquarters and ARTCC's. The headquarters operated from the FAA emergency operating facility and provided liaison personnel to FPA, as well as to the JCS alternate National Military Command Center.

While FAA used Rex 76 to the full in determining what its likely civil after-strike capability would be, Pole Vault 76 was unquestionably the most successful part of the exercise. In the opinion of most of the FAA personnel involved, it was perhaps the most profitable exercise of its kind ever participated in by the agency.

Implementing SARDA

FAA issued Advisory Circular 00-7A, a revised version of its long-standing State and Regional Disaster Airlift (SARDA) plan early in the period. The plan provided the 50 states, Guam, the Virgin Islands and Puerto Rico with information on how to organize and develop aviation emergency organizations which would be available when called upon during domestic crises and national disasters and emergencies. In essence the circular provided that the SARDA organizations would be made up of volunteers including private aircraft owners, pilots, mechanics, airport managers, and other active memebers of the general aviation community. It also laid down that FAA's general aviation district offices (GADO's) would provide the authorities in the 50 states, Guam, the Virgin Islands and Puerto Rico with whatever guidance was needed for the proper development of the Nation's 53 SARDA emergency airlift organizations.

The agency's GADO's and the GADO elements of the FSDO's could take satisfaction in the work they did for the SARDA organizations in their respective areas. To the extent that it helped insure that these volunteer airlifts would be ready to go when needed, it was clearly well worth the effort.

Other Developments

Other notable emergency readiness developments of the period included--

- o The evaluation at Seattle by experts of the Northwest Region of a new airborne command post capable of functioning as a flying White House in case of a national emergency. The Command Post, a new, four-engine Boeing 747, full of sophisticated communications and electronic equipment, was being tested to make sure that it met the same demanding safety standards as those prescribed for commercial jets. The plane was equipped with unusually powerful engines to meet the additional power requirements of its electronic and communications systems. The E-4B, as the Command Post was designated, was to be used by the Government to command and control U.S. forces in the event of a national emergency.

- o The conduct by FAA and the North American Air Defense Command (NORAD) of an unclassified simulation of the Security Control of Air Traffic and Air Navigation aids (SCATANA) plan. The object of the exercise, which had the full cooperation throughout of the Air Transportation Association of America,

was to pinpoint the precise locations of U.S. air carrier aircraft, world-wide, at the exact time the exercise was activated.

- An agreement to have the Emergency Operations Staff of the Office of the Secretary of Transportation share space with FAA in the FAA Headquarters Emergency Operating Facility. The agreement made it possible to consolidate resources, improve responsiveness and provide for the closest possible coordination between the FAA and OST emergency operating staffs.

- The initiation of a program by which the old maintenance intensive encryption equipment used in the Emergency Readiness Communications Security (COMSEC) program would be replaced on a one-for-one basis by new and modern solid-state equipment provided by the Air Force. The replacement of this equipment in this way would not only improve the reliability and long-term capability of COMSEC, it would substantially reduce its operating cost as well.

- The conduct of two EMEREDEX, FAA-wide "no-notice," emergency readiness exercises: one in November 1975; the other in February 1976. The object of

the exercises was to implement FAA's Emergency Readiness Level ALFA--an objective that was attained in both cases.

- The holding of weekly tests of the Emergency Readiness High Frequency Single Side Band Emergency Network. The operational capability of the network, which was controlled by the FAA Headquarters Operating Facility and included all regional headquarters and centers and such ARTCC's as were designated regional emergency operating facilities, were greatly enhanced as a result of the tests.

- The holding of an Emergency Operations Officers Planning Conference in December 1975 at FAA headquarters in Washington. The agenda included an analysis of FAA's responsibilities for Pole Vault 76 and Rex 76, as well as discussions of the emergency operations responsibility, including the high frequency single side band test and the emergency supply of emergency operations facilities. Also discussed were matters relating to the Civil Reserve Fleet (CRAF), the War Air Service Plan (WASP), the State and Regional Defense Airlift (SARDA) plan and FAA operations orders in support of certain JCS/USAF operations plans. Participants included the FAA headquarters

emergency readiness staff, FAA emergency readiness liaison personnel and region and center emergency planning officers, FAA-wide.

- The intensification of regional efforts to coordinate agency teletype networks with state emergency communications networks organized by Defense Civil Preparedness Agency (DCPA). These efforts were in response to an earlier Memorandum of Understanding between FAA and DCPA under terms of which FAA agreed to use its teletype network to relay "attack warning" messages to local civil defense directors who could not be reached by state DCPA emergency networks. The Central, Eastern, New England, Southern, Southwestern and Western FAA regions were in the forefront of this activity during the period.

Chapter 9

ADMINISTRATION

To carry out the agency's responsibilities from July 1, 1975, through September 30, 1976, $2,876,379,000 was appropriated by Congress, and 57,241 full-time permanent positions were authorized. For the 15-month period, the operations appropriation totalled $1,977,850,000 and six other appropriations totalling $898,529,000 made up the difference. The six were: the Airports Grants-in-Aid appropriation, $515,000,000; the Facilities and Equipment appropriation, $245,537,000; the Research, Development and Engineering appropriation $85,400,000; the Metropolitan Washington Airports (MWA) Operations and Maintenance appropriation, $23,292,000; the MWA Construction appropriation, $11,625,000; and the Facilities, Engineering and Development appropriation, $17,675,000.

Organizational Activity

The agency continued to function well organizationally though unlike the two previous periods when a great deal of organizational activity took place, things were quiet in that area during the period.

To be sure, there were some organizational changes. In headquarters, the Office of Aviation Safety was established; two offices--the Office of the Associate Administrator for

Aviation Safety and the Office of Associate Administrator for Airports--were abolished; the Airports Service was renamed the Office of Airports Programs; and the Metropolitan Washington Airports (MWA) organization, previously a headquarters echelon, became a field element. In the field, there was an important change pending at Oklahoma City as the period closed. Three branches of the Flight Standards Technical Division of the Aeronautical Center were to be transferred to the Flight Inspection National Field Office (FINFO), following which the expanded organization would be renamed the Flight Standards National Field Office (FSNFO), and report, as FINFO had before it, to the Director of the Flight Standards Service at headquarters. The change was to become effective October 1, 1976, the first day of the succeeding period.

But if the organizational changes of the period were few, it abounded with administrative achievements. Some of the more important of these are dealt with in what follows.

Management Improvements

In this area, FAA--

- Completed the conceptual and functional design of an up-graded FAA-wide uniform accounting system. By the time the period closed the contractor in charge of the program had worked out the detailed design of the general accounting system and the general design of the cost accounting system; and,

in addition, had begun development work on the property accounting system.

- Finalized the accounting requirements documentation for a uniform payroll system specifically designed for FAA's needs. The system was to be developed and installed FAA-wide by December 1979.

- Drafted a Data System Equipment and Services (DSES) plan to insure the orderly growth and development of automatic data processing (ADP) systems within the agency. Essentially a compendium of the automatic data processing projects planned for the next 5 years, the plan not only identified the resources needed to support the existing ADP system, it also identified the applications which would make it possible to further extend ADP techniques to additional agency operations and management functions.

- Established a micrographic management program to provide for the effective use of micrographic methods equipment and services, as part of the agency's printing documentation and retrieval systems.

- Prepared and issued a 190-page general aviation district office (GADO) management guide titled "Managing a GADO." The culmination of a concerted

effort by the Flight Standards Service and the Office of Management Systems to produce such a publication, the guide stressed management by objective techniques and drew on the experiences of successful GADO managers to show how best to manage a field facility of this sort.

- Established a monitoring system to help eliminate the problems experienced by members of the aviation community in obtaining essential aviation safety publications from the Superintendent of Documents in timely fashion. The program was set up in cooperation with the Superintendent of Documents who had already taken actions of his own to deal with the problem.

- Reduced the number of addresses on the agency's public mailing lists from 43,957 to 33,800, following a critical scrutiny of the lists. This represented a 23 percent reduction in the names on the lists and portended a substantial saving in future mailing operations.

- Purged FAA publications stocked and distributed by TAD-443.1, the departmental publications warehouse. Of the 982 titles stocked, 294 were considered obsolete and were discarded; and a certain number deemed to have documentary value were transferred

to appropriate depositories. In addition, realistic stock levels were established for publications retained in the warehouse. Major benefits realized were additional space for new acquisitions and improved service with associated savings.

- Significantly improved procedures for processing time-critical aviation safety publications, following a study in FAA headquarters of the printing and distribution cycle of this type of materials. These materials are now hand carried through each phase of the cycle, thereby insuring that they are handled in the expeditious manner they deserve.

- Produced a computerized mathematical model for airways facilities sector staffing. The model was capable of projecting on a quarterly basis for the next 10 years the exact number of employees who would have to be recruited to ensure that fully trained technicians were available to accomplish the projected workload throughout the 10-year period. Its special virtue was that it would provide a means to match personnel with workload in a precise manner; and not only help stabilize

the FAA Academy airway facilities training program on a long term basis, but serve also to greatly improve the utilization of academy instructors.

- Revised and expanded the FAA Glossary, a key publication which defines technical and administrative terms in use throughout the agency. The glossary was expanded almost 20 percent to include approximately 300 terms and 360 commonly used abbreviations. As such it served as an indispensable reference in dealing with agency affairs.

- Established a centralized telecommunications management office under the Associate Administrator for Air Traffic and Airway Facilities. The purpose was to eliminate the waste effort and excessive cost resulting from the previous system in which administrative and operational communications were managed separately.

- Consolidated two separate Air Traffic Control handbooks--one on terminal air traffic control, and the other on en route air traffic control--into a single Air Traffic Control handbook. The consolidation saved an estimated 10 million sheets of paper and eliminated hundreds of paragraphs of duplicate information on center and terminal air traffic control procedures.

- Reviewed approximately 1,500 national and FAA headquarters directives that were more than 2-years old to determine which of them needed to be discarded or rewritten. As a result of the review, approximately 15 percent of the directives reviewed were cancelled; approximately 20 percent were changed or revised; and the rest revalidated. Undertaken periodically, the review was to insure that the 170,000 pages of material in the agency's 7,000 or more directives were kept as current as possible.

Logistics

In this area, the province of its Logistics Service (ALG), FAA--

- Obligated $418,100,000 in contracts during the 15-month period. Of this amount, $266 million was obligated by the Contracts Division in headquarters, and the rest was obligated in the field. As of the end of the period, there were 832 contracts under administration in the Washington Office with a total dollar value of $1.5 billion.

- Effected a further reduction in processing time for major procurements. As compared to FY 1974 when processing time per procurement was 265 days and to FY 1975 when it was 211 days, processing time per procurement during the period was 181 days--

84 days less than in FY 1974 and 30 less than in FY 1975.

- Implemented a new automated reporting system for the capture of all FAA real property. The new system combined mechanical and manual systems into a single automated system. The system provided information on all FAA-owned property, FAA-leased property and other real property that the agency occupied, whatever the legal status of its use.

- Provided effective emergency resupply to the FAA operational activity on Guam, following the havoc wrought there in May 1976 by Typhoon Pamela. Alerted to the approach of the typhoon, the FAA Depot at Oklahoma City began immediate preparations to resupply the island. As a result, when the typhoon struck and resupply was requested, the depot had virtually every item of equipment requested ready to go. Trucked to nearby Tinker Air Force and loaded onto a waiting Air Force C-5A, the equipment reached Guam 65 hours after the FAA activity there put in its request.

- Awarded a total of 9 quality control certificates to qualified contractors under its Quality Control System Certification Program, and had two more pending as the period closed.

Civil Rights and Equal Employment Opportunity

The agency's civil rights organization consists of the Office of Civil Rights (ACR) in headquarters and civil rights echelons in the regions and centers. Mandated by Congress in various pieces of civil rights and equal employment opportunity legislation, the agency's civil rights and equal opportunity program is headed by the Director of Civil Rights at headquarters, who sees to it that its objectives are vigorously pursued. Among other things, the headquarters regional and center civil rights echelons see to it that FAA offers equal opportunity to all job applicants and all employees eligible for promotion; that contractors, subcontractors, suppliers and others doing business with the agency, are in compliance with civil rights regulations; and that the employment practices of recipients of Federal grants-in-aid and their contractors do not contravene them. In addition, they participate in the FAA minority business program which has as one of its principal purposes an increase in the participation of minority-owned firms in FAA contracts and in the construction and improvement of airports funded with the aid of Federal grants.

The agency made great strides in this area during the period and had many favorable developments to report. Among the more notable of these were the following--

- Further increasing minority group and female employment within the agency. As compared to the previous period in which minority group employees numbered 5,569, and constituted 10 percent of total agency employment, they now numbered 6,459 and constituted 11.29 percent of the total. Female employment, 7,454 employees, or 13.13 percent of the total during the previous period, now numbered 8,233, and constituted 14.11 percent of the total.

- Increasing total full-time employment of Hispanic Americans in the agency to 2.4 percent during the report period as compared to 2.2 percent during the previous period.

- Employing 1,186 women air traffic controllers as of the end of the reporting period.

- Increasing minority business concessions at airports across the Nation from 47 during the previous period, to 60 as of the end of the reporting period.

- Promoting contract awards to minority-owned business firms by awarding: (1) 310 contracts under the Small Business Administration's 8(a) Program totalling $19.5 million; and (2) 117 contracts and purchase

orders totalling $2.5 million under the regular procurement program, for a total of $22 million. This resulted in an increase of 17 percent over fiscal year 1975 when awards to minority firms totalled $18.7 million.

- Promoting 324 minority group members and women to senior and executive level positions. This number was made up as follows: (1) minority group males, to grade 13, 191; to grade 14, 56; to grade 15, 17; to grade 16, 2; (2) non-minority females, to grade 13, 29; to grade 14, 15; to grade 15, 3; (3) minority females, to grade 13, 11.

- Revising and improving equal employment opportunity statistical information and reports on training, employment awards, education, etc., of minorities and women.

- Appointing a Federal Women's Program Coordinator in each region and center; and, in addition, establishing a Federal Women's Program Committee in each to assist in developing support for the program.

- Appointing Spanish-speaking coordinators in regions with a high proportion of Spanish-speaking citizens. The number of Spanish-speaking coordinators increased

from 8 during the previous period to 11 in the reporting period. Of this number, seven devoted full-time to the function.

- Selecting Mr. Edwin T. Kaneko, as Chief of the Airway Facilities Division of the Pacific-Asia Region, the first Asian-American to be selected for such a position.

- Continuing a successful program to encourage the airlines to purchase goods and services from minority firms. United and Eastern Airlines were most receptive to the program and gave it substantial support.

- Launching minority business enterprise workshops for the promotion of minority business enterprise throughout the country. Minority business workshops were conducted in Boston, Oklahoma City, Pittsburgh and Los Angeles to give impetus to the program. Similar workshops were scheduled at other cities across the Nation to boost minority business enterprise there.

- Encouraging minority group and female employment among air carriers for whom FAA had contract compliance responsibilities. The 26 major airlines in this category employed 33,540 minority group members or 13.3 percent of total airline employment. Female employment was 30.95 percent of the total.

- Awarding Mrs. Nellie Ruby Sigourney, the first woman in the Central Region to qualify for it, a maintenance inspection authorization. Mrs. Sigourney, an active A&P mechanic, also held commercial pilot and flight instructor certificates.

- Promoting Mr. Kenneth S. Borrego, to be Assistant Chief of the Pierre, S.D. flight service station. Borrego, a minority group member, joined the agency in 1970 as a GS-4 predevelopmental air traffic controller.

- Appointing a full-time EEO Program Manager in the Office of Civil Rights to improve coordination and avoid duplication of effort in that area.

- Appointing Ms. Mary Ellen Kraus, as Chief of the control tower at Salem, N.C.; Ms. Carolyn Jackson, as the first female air carrier cabin safety inspector, at the Kansas City ACDO; Ms. Patricia K. Henderson, as the first female pilot examiner at

the Des Moines GADO; and Ms. Gail Gorski, as the first female pilot to be based at FAA's Hangar 6, Washington National Airport.

Labor Relations

The Office of Labor Relations (ALR) is the principal staff element in FAA for labor relations programs. It develops and recommends labor relations policies and standards; provides labor relations advice and guidance to FAA management at all levels; and represents management in labor negotiations and other proceedings under its purview. The goal it seeks is a stable relationship with agency labor organizations within a framwork which will not interfere with the agency's accomplishment of its mission. In the furtherance of that objective, ALR administers programs which recognize the role and legitimate interests of labor organizations as representatives of FAA employees in bargaining untis. In addition to labor-management relations ALR concerns itself with questions of conduct and discipline, adverse actions, appeals and grievances and restrictions on political activity.

As of September 30, 1976, FAA recognized nine different labor unions. The nine unions represented over 36,000 of its employees. Of that number, over 18,000 had dues withheld from their pay and nearly 28,000 were covered by labor

agreements. The number of employees represented by unions increased by about 20 percent during the period.

In April 1976, a nationwide bargaining unit of some 7,700 Airway Facilities employees selected as their exclusive representative the Federal Aviation Science and Technological Association (FASTA), a part of the National Association of Government Employees (NAGE). An objection by the American Federal of Government Employees (AFGE) to the conduct of the election delayed FASTA/NAGE certification for several months. The objection was dismissed by the Department of Labor, which supervises such elections; and FASTA/NAGE was certified as exclusive representative of the employees in late September 1976, just as the period closed.

A new labor agreement with the Professional Air Traffic Controllers Organization (PATCO), covering its 17,800 members, was concluded just as the period opened and became effective July 8, 1976. Highlights of the agreement, which incorporated the Fair Labor Standards Act for overtime work, included an improved grievance procedure, immunity program provisions more liberal temporary promotion procedures and expanded employee rights. In addition the parties negotiated numerous changes and refinements in the language of previous agreements covering matters affecting personnel policies and practices and other matters having to do with working conditions.

Renegotiation of the labor agreement with the National Association of Air Traffic Specialists (NAATS), covering some 3,700 employees in FAA's flight service stations, which had been in progress when the period began, was delayed for months by an unsuccessful NAGE challenge for the right to be their exclusive representative. As the period closed, FAA and NAATS were close to a new labor contract for NAATS's 3,700 flight service specialists.

During the period, PATCO, an affiliate of the Marine Engineers Beneficial Association (MEBA), AFL-CIO, affiliated with NAATS, which, as a result, also became an AFL-CIO affiliate. In addition, the International Brotherhood of Teamsters, a newcomer to the Federal Labor-management relations scene, won exclusive recognition as bargaining agent for two local FAA units--an air way facilities

sector in the Chicago area; and the airport police branch on duty at Washington National Airport and Dulles International Airport.

The period was marked by an increase of unprecedented proportions in grievance and arbitration actions. For example, for the 3-month period July through September 1975, FAA received 139 requests for arbitration from PATCO. During the same period in 1976, PATCO made 589 requests for arbitration, more than four times the number in 1975. All nine unions together submitted 317 grievances in the July through September 1975 time frame. During the same 3-month period in 1976, they submitted 1,543, almost five times that number, and most were PATCO grievances.

PATCO alone accounted for 2,750 of the 3,053 grievances submitted during the reporting period, a figure that was almost five times the 527 grievances of the previous period. The story was much the same with requests for arbitration which numbered 939 for the reporting period, as compared to 91 for the previous period.

The increase in grievances and requests for arbitration did not portend a deterioration in the FAA labor-management relationship. Rather, it was the result of attempts by PATCO to test the meaning of the language of its new agreement with the agency, and particularly that part of it related to recent Fair Labor Standards Act amendments. The increase did, however, represent a staggering increase in the workload of ALR and its field echelons who had never before been faced by so many grievances and requests for arbitration.

A further notable development of the period in this area had to do with the preparation by the Civil Service Commission, the final

authority in such matters, of center and tower air traffic controller classification standards. The existing standards which dated back to 1968, allowed a maximum grade of GS-13--and no more--for fully-qualified, line air traffic controllers regardless of the traffic activity at their respective installations or the complexity of the instrumentation at those installations.

A review of the existing air traffic controller classification standards had been called for by FAA's 1973 labor agreements with PATCO and NAATS, and FAA had conducted joint studies with each of them on the subject. The two reports were routed to the Secretary's office which forwarded them on to the Civil Service Commission with a request for an occupational study of air traffic controller positions which would recognize the tremendous changes which had taken place since 1968 in the air traffic control function, and its increased complexity, especially at the highly automated and computerized centers and the high traffic volume terminals.

In February 1976, the Civil Service Commission announced it was undertaking a review of the classification and qualification standards of the air traffic control career field, and that in view of its importance would give preparation of the study its highest priority. The review began in March with visits to representative air traffic control centers, terminals and flight service stations, and continued for the next several months.

In May 1976, at a PATCO convention to which it had been invited, the Civil Service Commission told the controllers it would have its classification study on controller jobs completed by July 30. On the 22nd of July it notified FAA and PATCO that while its report was in draft, it would not be completed until some time in the fall because of the need to further analyze the vast amounts of data gathered in the previous few months. The Commission added that with regard to the request for increased pay for the controllers, it could see no reason for it; and not only proposed downgrading certain controller positions, but held that there appeared to be no good reason to promote line controllers at the centers and high density terminals to the GS-14 level sought by PATCO.

What happened next could easily have been predicted. On July 28, 1976, the union began a "by-the-book" slowdown at airports across the Nation. The slowdown ended 3 days later, when FAA which was caught in the middle, called a meeting of all the interested parties to talk things out.

At the meeting which was attended by the FAA Administrator, Dr. McLucas; Mr. John Leyden, the president of PATCO; Mr. Robert Hampton, Chairman of the Civil Service Commission; and Representative David Henderson, Chairman of the House Post Office and Civil Service Committee, it was agreed that the Civil Service Commission would complete its draft reclassification study by August 31; that FAA would comment on the draft and the final reclassification schedules would be put into effect as soon as possible after FAA's comments had been received.

In early September the Commission released its report. Not only did it fail to authorize GS-14 positions for line controllers at the centers and high traffic volume terminals, it recommended the demotion of a substantial number of other controllers at less busy airports. This time FAA took the initiative. Dr. McLucas accompanied a letter to the Chairman of the Civil Service Commission, critical of the report, with one to PATCO in which he assured the union that he would see to it that the Commission gave the matter further thought when it drew up its new standards.

The Administrator's letter, and the agency's no less critical comments on the report, were duly received by the Commission which promised they would be given the fullest consideration when it framed the new standards--which was where the matter stood when the period ended.

Training

In this area, FAA--

- Launched a new standardized training program for newly-hired en route and terminal air traffic controller trainees. The program, the fruit of a great deal of thought and planning, combined training at the FAA Academy and at field facilities with a scientifically-based screening process at the academy. The program called for: (1) two weeks of field facility orientation; (2) 15 weeks of qualification training at the Academy, during which the trainees were carefully observed and screened; and (3) final facility training for those who survived the screening and satisfactorily completed the academy course. A total of 1,053 new trainees entered academy training under the program in the 9-month period, January 1 through September 30, 1976. Forty-four (including 12 who withdrew) failed

to graduate and the remaining 1,009 who did graduate, went on to final facility training.

- Reorganized ILS technician training to insure that the student received instruction which applied to the ILS at his facility. If the facility equipment changed the employee could be retrained in the new equipment either on site, or at the academy.

- Developed an on-thejob training manual to enable employees to update themselves at their facilities on solid state communications equipment without having to be returned to the academy for training in it.

- Planned a radar training facility at the Aeronautical Center to be used in basic terminal and en route air traffic control training conducted at the FAA Academy. This would expand the training capabilities of the academy sufficiently to make it unnecessary for the field facilities to give the present initial radar orientation for new air traffic control trainees.

- Initiated a project to permit progressively greater involvement by the private sector in the conduct of flight instructor refresher clinics. The target date for complete FAA withdrawal from the activity

was tentatively set for November 1, 1977. As of the close of the period three private organizations had been approved by FAA to conduct the clinics and the applications of eight more were being processed.

- Developed computer-assisted instruction (CAI) for FAA Academy Air Traffic Control, Airway Facilities and Flight Standards courses. The results not only showed CAI to be a viable medium for FAA training, but also that academy students learned better, required less instruction and were highly motivated by this type of instruction. It was expected that computer-based training of this type would be of help in keeping the cost of technical training of this sort in bounds.

- Reintroduced pass/fail criteria for terminal and en route air traffic control training programs given at the FAA academy. In these programs, three phases of training were given in the en route programs, and four in the terminal option. Through a series of tests and evaluations a composite score was worked out for each phase and the pass/fail criteria were determined on that basis. A student had to successfully achieve a passing score in one phase to be allowed to go on to the next.

- Expanded FAA-COP, it nationwide, after-hours college opportunity training program. Under this program FAA employees can attend nearby colleges after hours, and Airway Facilities personnel can take college training program leading to the bachelor of science degree in engineering; and they can also prepare for and take engineer-in-training examinations qualifying them for the Professional Engineer certificate. During the period, 334 FAA employees were enrolled in the program and 56 graduated.

- Continued for the 4th year, the air traffic controller second career training program. Of the 1,366 individuals who had entered the program since September 1972, when it first began, 231 had successfully completed their second career training and 731 were in a training status. Of those 731, 374 were taking university or college training; 223, on-the-job, non-government training; and 105 technical or vocational training. Three were taking combination programs and 26 were in the program but not actively training.

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